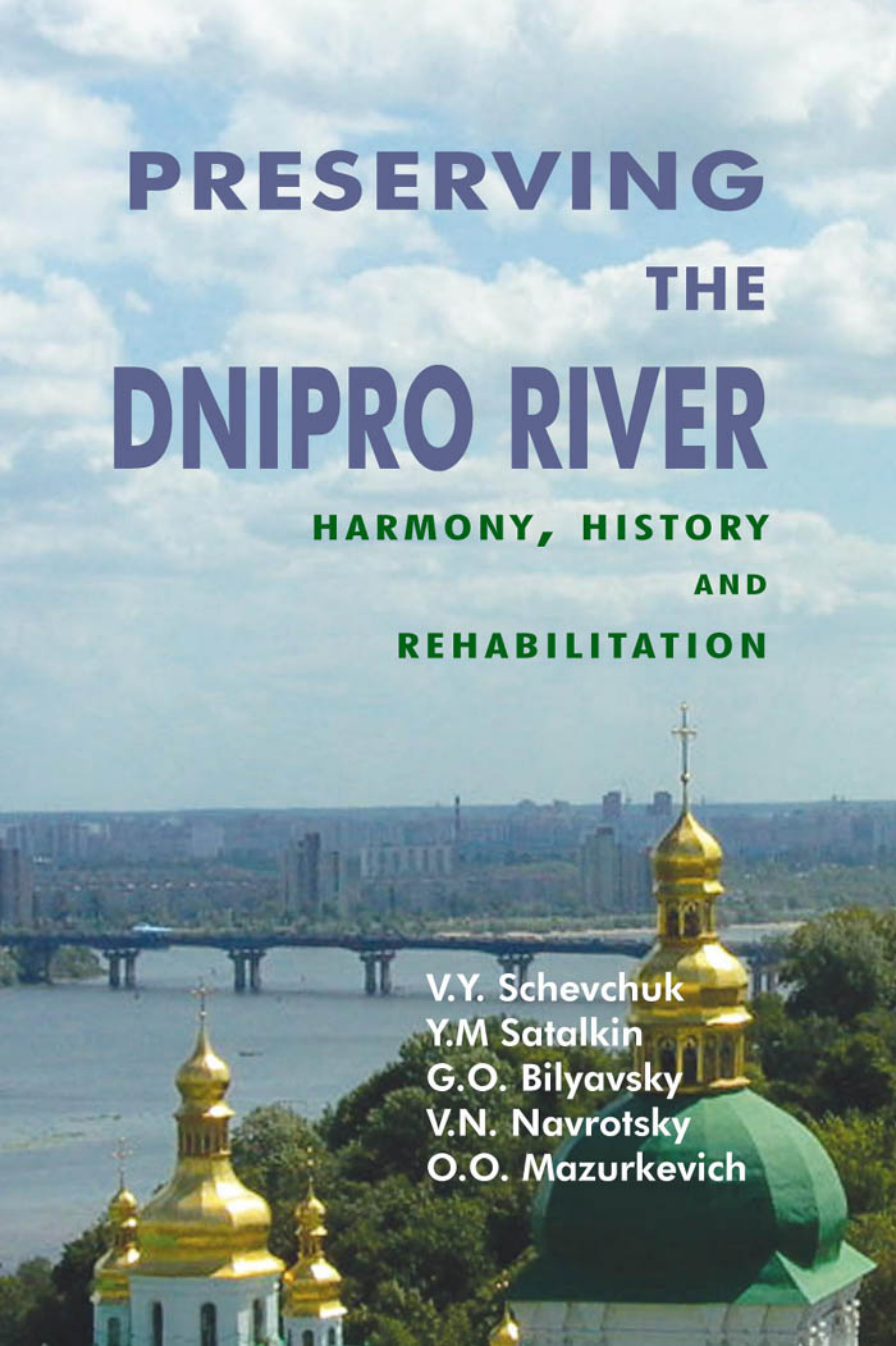
PRESERVING THE DNIPRO RIVER

HARMONY, HISTORY AND REHABILITATION



V.Y. Schevchuk
Y.M Satalkin
G.O. Bilyavsky
V.N. Navrotsky
O.O. Mazurkevich

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International Dnipro Fund, Kiev, Ukraine,
National Academy of Sciences of Ukraine,
International Development Research Centre, Ottawa, Canada,
National Research Institute of Environment and Resources of Ukraine

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Vasyl Yakovych Shevchuk

Georgiy Oleksiyovich Bilyavsky

Vasyl Mykolayovych Navrotsky

Oleksandr Oleksandrovych Mazurkevich

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info@mosaic-press.com

www.mosaic-press.com

THE BOOK WAS WRITTEN UNDER DIRECTION OF

Vasyl Yakovych Shevchuk
Doctor of Economic Sciences, Professor, President of International Dnipro Fund, Minister of the Environment and Natural Resources of Ukraine 1998 - 2000, 2002 – 2003

Co-authors:

Yuriy Mykolayovych Satalkin
Doctor of Technical Sciences, Assistant Professor, Chief researcher, National Research Institute of Environment and Resources of Ukraine

Georgiy Oleksiyovich Bilyavsky
Doctor of Geological and Mineral Sciences, Professor, Head of the Environmental Policy and Education Department, National Research Institute of Environment and Resources of Ukraine

Vasyl Mykolayovych Navrotsky
Assistant Professor of Law, Kyiv Academy of Water Transport, Head, Board of International Dnipro Fund

Oleksandr Oleksandrovych Mazurkevich
Doctor of Geographical Sciences, Director General of Ukrainian Land and Resources Management Centre

Editor:

P. M. Gvozdetskiy

Canadian Editorial Board:

Howard Aster
Ken Babcock
Kerry Franchuk

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FOREWORD

THIS BOOK WILL greatly interest readers for two main reasons.

Number one is that this is the first attempt of its kind to explain the fragile ecosystem of the Dnipro – a river of extreme importance to the millions of Ukrainian people who found it in a disastrous state after the nuclear pollution resulting from the Chernobyl catastrophe.

The second reason is that our way of thinking about the environment, coming from our highly materialistic society, does not easily fit other countries, which may have a different, more holistic – even spiritual – relationship with the environment. Therefore, this book is an interesting attempt to link key environmental concerns with the long history and culture of the people living there.

Jean-H. Guilmette
Director, Office for Central & Eastern Europe Initiatives
International Development Research Centre, Ottawa, Canada

FOREWORD

YOU ARE HOLDING in your hands an unusual book. The authors highlight the problems of sustainable development proclaimed at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 and confirmed by the delegates to the World Summit on Sustainable Development held in Johannesburg in 2002. In this book, a bold attempt has been undertaken to approach these problems in a new way – by using the power of the harmonizing forces of peoples, societies, and nature, a new model based on the historical analysis of the development of civilisations.

The authors' main viewpoint is a vision of nature as the source and essence of life, rather than the main provider of resources for sustainable development. The authors convey this concept through vivid examples of one of the biggest rivers in the world, the famous Dnipro, highlighting its rich history and the key role it has played in the formation of the spirit of the Slavic people, the ancestors of modern Ukraine, Russia, and Belarus. As the Damocles sword of Chernobyl fell on Ukraine for careless and thoughtless behaviour, the mighty Dnipro suffered immensely from the disastrous ecological consequences of the largest environmental catastrophe of the 20th century.

The theme of this book is multifaceted and complex, both from the scientific point of view and from a global perspective. Nowadays, in the scientific and political spheres more and more people realize the small amount of practical return from and question the feasibility of the global strategy for sustainable development adopted in Rio de Janeiro a little over ten years ago. The strategic goals have not been reached. Recent world economic expansion without deep environmental concern is increasing the gap between rich and poor, indicating a profound global environmental crisis. This critical situation leads the authors to the conclusion that without a joint effort and spiritual unity in understanding the fragile mechanism of nature by the people, nations, societies, and specialists working on various environmental projects, it will be impossible to reach a better level of life. Only human spiritual development can restrain the blind pursuit of higher economic profits at the expense of nature's exploitation by the market economy.

Spirituality is a category of divine acquisitions of humanity according to the laws of nature and harmony. All people have the same origin; the difference is in their spiritual heritage, for the accumulation of intellectual force comes from different historical scenarios and sources. From time immemorial the purpose of science has been to comprehend the laws and mysteries of nature and to share its wisdom and the accumulation of knowledge on harmony, a holistic perception of the world, and the coexistence of humans and nature. This unity, this holistic perception of the universe, was replaced by the Cartesian scientific approach in later centuries. Its materialistic philosophy played an essential role in destroying the spiritual-environmental unity of human beings and society. Finally, the 20th century clearly demonstrated the danger, to people's lives and human civilisation as a whole, of ignoring the laws of nature and harmony.

Now, at the beginning of the 21st century, the vital powers of human civilisation have almost reached their extinction. Today, it is our duty to raise spiritual-environmental concerns in the world community about the necessity of finding a way out of the social-economic crisis in order to reach sustainable development and preserve our nature for future generations.

The authors have successfully managed to outline and retain throughout the text the notion and meaning of this painful problem despite its complexity, contradictions, and multifaceted character. Their broad point of view and balanced approach in reflecting this worldwide problem deserves the serious attention of scientific and political organisations in Ukraine, Russia, and Belarus, as well as in other countries whose people live along the shores of great rivers.

Therefore, this very timely book by Ukrainian scientists may be used to further develop ideas for the harmonious co-existence of human beings, society, and nature, the rehabilitation of their vital powers, and the practical implementation of strategic plans aimed at harmonising human interactions with the environment.

B. Paton
President, National Academy of Sciences of Ukraine

Those, who live with a sole purpose to achieve pleasure and avoid suffering... ought not only go through life again and again, until they complete its course, but each time their experience will bear more hardship. If one does not wish to learn from oneself, he should be apt to learn from others. Those who do not wish to learn from reincarnation are forced to do so by cruel trials and misfortune.

Mabel Collins, English author and philosopher
Oriental School of Spiritual Enlightenment

I. A GLANCE THROUGH THE CENTURIES AT THE PHILOSOPHY OF MODERN LIFE

At the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 (the Earth Summit), where one hundred and seventy-nine countries were represented, a global developmental strategy, which became known as 'Sustainable Development', was proclaimed. This strategy received a further and renewed impulse at the World Summit on Sustainable Development held in Johannesburg in 2002. The basis of the global strategy for the survival of humanity is founded upon the principles that all forms of development must conform to environmental, social, and economic goals and that development must achieve a balance among the economic, social, and environmental interests of all sectors of society that must be implemented according to national strategic action plans.[63] These objectives and principles seem obvious from the viewpoint of the natural laws of harmony or the coexistence of humans and nature. They are also vital if not obvious from a solely practical viewpoint—if these objectives and principles are not enshrined, then humanity faces the realistic threat of extinction from the face of the earth.

There is, however, one 'but'. Co-ordination and balance may only be achieved on the condition of the voluntary acceptance of restrictions.

This acceptance can be achieved by way of restricting the voracious appetites of wealthy nations and, in particular, the monopolistic transnational manufacturers; restricting the flagrant permissiveness in attitudes towards nature which results in dramatic transformations of landscapes and ecosystems; and by constraining the total dominance of those economic and political regimes which emerged towards the end of the twentieth century and brought about the degradation of many traditional ethical norms relating to humanity's relationship with nature. There must be systemic restraints imposed upon or self-imposed by these states, societies, monopolies, and individuals in both the material and spiritual dimensions of human existence. This conscious acceptance of systemic restraints is, in itself, a change in psychology and view of the world. It implies a dramatic revision of life's values and, therefore, a change in life's philosophy. There is an ancient but vital Hindu axiom which states that "all obstacles on the path of human development are overcome through the renouncement of commonly accepted views of the world."

In historical terms, the 'life without limitations' approach to human civilisations evolved at the beginning of the Holocene epoch, that is, following the Neolithic revolution, when people mastered agriculture and animal breeding. Thereafter, human beings began to create artificial ecosystems and the artificial circulation of matter in nature, or 'second nature' began to evolve. Coincidentally, at this time people began to detach themselves definitively from the rest of the living world. They began to view themselves as conquerors of the world and the net result was that a considerable part of contemporary humanity is now obliged to those conquerors for their standard of living, life expectancy, and prosperity. But, at the same time, this leads to ecological and spiritual impoverishment.

In the process of these developments, humanity has infringed upon the principle of 'sustainability'. We became monopolistic and acted in a way that disregarded the vital development of his home—the biosphere. The indispensable harmony between the development of humankind and environment disappeared, the principle of harmonious coexistence was disturbed.

The noted and prominent Russian scientist-ecologist N.N. Moiseyev pointed out that not only has the number of the earth's inhabitants soared, but the needs of each of them have as well, especially over the last century. The load on the biosphere began to increase and, according to the academician V.I.

Vernadsky, humankind became the fundamental and dominant geological force on the planet. Animate nature began to deteriorate. The available resources that are indispensable to humankind's survival began to decline. The pollution of the planet reached a critical point, which reminds us of a fundamental truth that no living species may exist in an environment consisting of its own waste. Humans have reached the abyss. People have gradually begun to realise that the potential capabilities of modern civilisation are exhausted, or close to it. We are now overwhelmingly faced with the urgency of establishing a new paradigm of civilisation, a new philosophy of life.[53] The philosophy of human existence is complex and has evolved through different historical periods and paths. Eastern and ancient Greek philosophies harmonised our way of life with the wisdom of animate nature. But at a later historical period, our philosophy came into conflict with the natural laws of harmony between ourselves and nature and turned into an ideology serving the advocates of consumerism. Philosopher-materialists and Cartesian scholars played a significant role in this materialisation of philosophy. They splintered the harmonious completeness of nature into elementary parts. One of the scholar-physicists, Werner Heisenberg, a Nobel Prize laureate, came to his senses in time. He perceived the ruinous force of the Cartesian world view and wrote the following in his book *Physics and Philosophy*:

> The divisive nature of the Cartesian philosophy has profoundly penetrated the human consciousness over three centuries and it requires time to be replaced by other attitudes to the problems of reality. (quoted in 35)

Apologists for this materialistic philosophy, relying on the authority of other prominent scholars of the 20th century, namely Heisenberg, Erwin Schrodinger, Niels Bohr, and Albert Einstein, extended the influence of this ideology on the consciousness of so-called educated humanity. It bode well for certain political and economic elites. And, just like their communist opponents, these elites used this materialistic philosophy for profit and drove humanity to the edge of an immense ecological crisis, if not utter catastrophe.

The realization of this ecological crisis brought about a new ecological paradigm—a recognition of an ecological system of values, notions, and perceptions founded upon the harmonisation of the relationship between people, society, and nature. And this can, indeed, form a new systemic vision of reality.

This new ecological paradigm can provide an impulse towards the formation of a 'new' and contemporary philosophy of life.

Paradoxically, however, it ought to be recognised that this new life philosophy was essential primarily for the 'golden billion'* population of the earth. The remaining five billion steadily held to the postulates of the more traditional eastern or ancient Greek philosophies of life which are founded upon a harmony between human nature and the environment. However, the 'golden billion' elite proclaimed the natural environment of the whole planet within its sphere of vital interests. The tentacles of the ecologically ignorant world elite penetrated into all of the earth's natural storehouses!

Today, there is an increased need to reanimate the wisdom this harmonious approach to human nature and the environment as a world outlook, to use it to comprehend reality and to meet the numerous challenges posed by practical issues. Only on the basis of a harmonious combination of experience and reason can we meet these problems.

One example is the desire to retrieve from apparent oblivion the ecological teachings of Vernadsky on noosphere, or of S. A. Podolynsky on the sun's value-added energy. Both are modern perceptions of the means, methods, and mechanisms for harmonising human development.

The Ukrainian philosophers M. M. Kyseliova and F. M. Kanak 37 argue that the concept of wisdom today is the understanding of proportion, moderation, and universal harmony and that these acquire a special role in our contemporary stage of development. They regard the lack of a sense of moderation as a premise for imminent evil. The sense of proportion and harmony embodies a perception of outer as well as inner worlds. The ancient sage Seneca called wisdom the mentor of the human soul. He associated knowledge and comprehension of the world with compassion and beauty.

Humanity inherited the true sense of proportion, synergy, and harmony from the natural environment. The cognition of nature was first and foremost a means of drawing humanity closer to the earth and the universe.

Furthermore, a sense of proportion and harmony leads to the formation of various manifestations of wisdom, such as sagacity, moderation, prudence, a sense of reason, responsibility—all of which are qualities that contempo-

* 'Golden billion'—the population of the economically (as opposed to spiritually) most developed countries of the European Union and North America.

rary humans are critically short of. Wisdom is, therefore, proportional to the experience acquired in the process of humankind's self-determination. It is appropriate to assume that this is the foundation on which all morality, as well as the mechanisms for societal prohibitions and customs, rests.

Human beings do not need to divine the courses of action for, historical details of, or the optimal path for development. However, we are capable of envisioning dangers that may await us in the near future. And this ability is sufficient for establishing a certain system of interdictions capable of diminishing the negative impact of possible difficulties and, sometimes, of avoiding them If we exercise this capacity we may well increase the stability of our species' existence. That is how Moiseyev explains the "mechanisms of wisdom" in his work *Fate of civilization. Wisdom's Path.*[53]

In response to this 'new life philosophy', the notions 'ecological consciousness' and 'ecological wisdom' have recently been widely discussed as self-constraining principles of contemporary economic and technical thought. These ideas call for a fundamental change in the structure of our scientific methodology and technological approaches, in addition to a fundamental change in our attitudes towards nature. Today, the consumerist approach towards nature still prevails, and as a result so does our dominant attitude towards the immorality of humankind. The establishment of a genuine environmental consciousness, as well as the formation of an ecological culture and wisdom, will automatically bring about the desperately required spiritual recovery of society and the replenishment of its spiritual forces.

The connection between ecology and spirituality has profound historical roots, which extend back thousands of years. This connection was lost in the abyss of the centuries, which led civilisations to their present crisis, if not doom, but it has now resurfaced, and is being revived. Even though our comprehension of the secrets of wisdom, the understanding of the natural order and harmonious coexistence between humanity and nature have been the objectives of science since antiquity, over the last two to three hundred years this connection has been corrupted and manipulated in the interests of profit-seeking science. Beginning in the 17th century, exploitative knowledge applicable to farming and the so-called stewardship of nature became of primary importance. [35]

A contrary view, namely an unbiased view of reality, a sober evaluation of realities and an orientation towards results in the future, that is, the ability to forecast the future from current phenomena and processes, serves as an indication of wisdom.

Kysel'ov and Kanak emphasise that attempts to separate the world of organic nature from other phenomena of objective reality have been made since ancient times. Aristotle considered *entelechy*, the moment of eternity that permeates the body with life, as evidence distinguishing the living from the dead. Later, as counterpoise to the mechanistic interpretation of life processes, the term *vis vitalis* was introduced, meaning "a special vital force." (L. Duma, I. Drish)

The definition of life may be approached either from a naturalistic/scientific or a socio-humanitarian position. Normally, the former is interpreted as a mechanism for the self-support, self-regeneration, and self-development of large systems consisting of complex organic structures that are created as a result of internal metabolism and the exchange of matter between them and the environment, as well as the result of the influx of energy (Reimers). The natural law of harmony is the unity of physical/biological and spiritual life. If we infringe upon this natural law, ecological and social crises will result.

The movement of contemporary ecological-philosophical thought and, to a greater extent, the presence of ecological threats and the growing number of incidents of grave concern compelled political leaders of many countries to gather in 1992 in Rio for the Earth Summit. The aim was to develop common approaches and principles for the further development of humankind without causing harm to nature and for the conservation of nature for future generations.

The very fact that a global ecological and social conference, along with the follow-up world summit later in Johannesburg, was held is testimony to the profound uneasiness and concern about our global ecological crisis. The concept and principles of sustainable development were developed using a balanced approach to ecological, economic, and social elements.

Nonetheless, the last ten years have failed to produce the expected results. Some environmental scholars attribute the failures on the path to sustainable development to the poorly selected approaches for assessing the values of life and to an inappropriate methodology.

Moiseyev notes: "Following the Congress in Rio de Janeiro in 1992 the term *sustainable development* appears. It is a poor combination of words since under current circumstances the term can only be applied to local fulfilment of provisions of sustainability. This realisation could be an important step towards the epoch of noosphere, that is an agreement (or harmony-author's suggestion) between *'nature's strategy and humankind's strategy'*. We ought to master the tools we possess in order to use them wisely. Landscapes, which seem attractive from an environmental point of view, may be considered such a tool. Their number is constantly decreasing while their value is on the rise. In recent years the urgency of the problem (noospherogenesis) significantly exacerbated: noosphere eruptions may become the spark for a global ecological movement, capable of directing the development of global community to avert an ecological catastrophe."[52]

The Dnipro basin, from this point of view, is one such 'ecologically attractive regional landscape'. It could become the spark for a 'basin noosphere area', that is, an area of harmonious relations among the peoples of the Dnipro basin and within the habitat of the Dnipro basin, as well as the establishment of a regional ethno-scenic balance—a harmony of vital forces.

Why the Dnipro and the Dnipro's vital forces?

The Dnipro is now entrenched in human history, alas, as a result of the Chernobyl disaster. One wishes, however, that the Dnipro could serve as the starting point of a genuine rebirth of divine and natural laws, genuine in the sense of an ecological and naturalistic-spiritual renaissance of nations. One is not possible without the other today. Only the unity of ecological and spiritual regeneration will save the planet. A strategy of eco-spiritual regeneration will balance national and global interests and will alter our system of values. Only then may one speak of a sustainable society on the basis of a new eco-spiritual philosophy of global structure without the dictates of young civilisations with totalitarian democracies or commercialised societies devoid of spirituality. We should acknowledge that society is often reluctant to develop. Yet, societies often enjoy prosperity. Development can be viewed as coercion of traditions, order, and customs. Society may be afraid to develop. What if we choose the wrong path where the contradiction between society and state become apparent? The fact that states adopted a strategy for sustainable development in

Rio de Janeiro does not necessarily mean that society or nations have done so. The expediency of the sustainable development approach should be proved by way of specific examples.

Besides having a special ecological, economic, and social significance for Ukraine, the Dnipro basin also has a special spirituality, a special national value, whose roots reach back thousands of years. The Dnipro and Ukraine—these are the father and the mother of the Ukrainian nation. They cannot possibly live without each other.

The Dnipro basin has been a cradle for many cultures and civilisations for a period of over ten thousand years (Trypillian, Indo-European, Scythian, Cimmerian, Hellenic, Slavic, and others), which are the roots of the ethno-scenic cultures of the Ukrainian oblasts of Poltava, Kirovohrad, Zaporizhzhia, Cherkasy, Kyiv, and Chernihiv and the Russian oblasts of Smolensk and Briansk. Through its trade routes, it connected the 'Varangians to the Greeks', the 'Bulgarians to the Greeks and Europe', and Iranian, Pre-Sumerian, and Greek cultures.

The Dnipro's vital forces do not come solely from its water, nor from one of the best black soils in the world, nor just from the beautiful scenery of small and large influents. They come from the spirituality of the Slavic ancestors of the Ukrainian, Belarusian, and Russian nations. Today, this inherent spirituality continues to be charged by the inexhaustible power and incomparable beauty of the Dnipro's natural habitat. The habitat is still capable of self-regeneration, despite the disastrous technogenic harm to the ecosystem of the Slavutych basin. These include the Chernobyl catastrophe, artificial reservoirs that buried fine soils and meadows, and riverside towns-technopolis which have turned a river of national pride into a sewer.

We have the capacity to destroy our physical and spiritual powers, and to kill our souls and nature by contaminating the soil and water with waste, regardless of where we live, but specifically in the upper and lower reaches of the Dnipro.

The ancient Slavonic peoples had a custom of *toloka*—joining hands in a community effort. The entire community participated in solving everyday problems and assisted in times of need. This custom has survived among the Ukrainian, Belarusian, and Russian peoples of the Dnipro basin. The time has

come now to join hands in a national ecological community effort to respect the source of our vital force.

The word *ecology,* translated from Greek, means *study of one's own house.* Moiseyev added, "as well as norms of conduct required for living in this house." The ecosystem of the Dnipro basin is our common house and we are the basin's inhabitants and an integral part of it. Our conduct should establish a harmony of vital forces of people and nature in the Dnipro basin, throughout its course from Valdai to the Black Sea.

The Dnipro, known throughout the world as a beautiful and generously endowed natural body of water, may serve humanity by providing an ethnoscenic balance—an alternative model of existence for the peoples of the three riparian states, based on the principle of systemic co-evolution and harmony of vital forces between the Dnipro and its peoples. Contrary to the model of global sustainable development, wherein the dominance of the economic component is maintained (there is even a term 'sustainable economic development'), models of harmonious existence have the objective to harmonise the coexistence of humankind (ethnos, society) and the environment (river basin, landscapes) on the basis of noospherogenesis. This objective is more understandable and may appeal to everyone. A state policy on development to improve specific environmental sites, in this case the basin of a large Slavic river, the Dnipro, will become comprehensible to all. It harmonises the interests of people, society, and state.

Humanity may rely on the thousand-year experience of the Hindu civilisation, founded upon the harmonious co-existence of humans and nature. The concept of 'development' is not inherent in oriental philosophy. The term 'change' is more familiar and more understandable. Historians and archaeologists find Indo-European roots in the Slavonic culture. In contemporary India, there is a custom of water cleansing in the river Ganges (the sacred river of life) and other rivers. The Orthodox faith has a cult of purification with water, expressed in the rites of baptism and blessing by the sprinkling of water. The present day custom of bathing in icy waters, practised in Russia, Ukraine, and Belarus, is a way of regeneration and the strengthening of vital forces. However, only in India is the religious rite of cleansing with water harmoniously associated with the customary sustenance of the ecological purity of water

bodies at the subconscious level. It is worth mentioning here how relevant the questionable existence of the 'philosophy of water', or rather the 'philosophy of live and dead water' as we know it from childhood fairy-tales (fairy-tales, like dreams, come true) is.

Water is not simply H_2O. It is a stream of vital forces. Water preserves the great mystery of nature. It gave birth to life on earth and continues to support it. "The principal purpose of water is to serve as an informational base for biological life in the Universe. It is namely water which is the basis of all processes in the plant and animal kingdoms of our planet," as stated by the Russian scientist V. D. Plykin in his book *In the Beginning was the Word... A Mark on the Water*. 60 We also consist of 80% water. Plykin finds special informational properties in water, which form the basis of live organisms and matter. They also form a part of the informational system of global order in the universe. In this context, it is the basis of harmony in life, the lack of understanding of which has resulted in a crisis in modern science, ecology, energy, and spirituality.

What could be more valuable than water, soil, or air? Their value is life itself! For now, 'live' water continues to flow from the Dnipro, although its vivifying properties are on the verge of depletion. The community as a whole must assist in the rehabilitation of the Dnipro waters. And not just the waters, but the entire basin ecosystem. Only great aims awake the Great Spirit. Harmonising the vital forces of the Dnipro and the peoples that inhabit it is a great spiritual and ecological goal. It will awaken and lift the human spirit to such an elevated state that humankind will become incapable of causing harm to itself or nature. We will come to understand that we are part of a live organism, whose name is nature or universe. We will fulfil our biblical predestination: "The LORD God then took the man and settled him in the Garden of Eden, to cultivate and care for it." (Genesis 2:15)

Interestingly enough, great scientists throughout the ages have seen the divine laws of harmony in all phenomena of nature. Arthur Compton, physicist and Nobel Prize laureate, wrote the following:

> For me, faith begins from the notion, that a higher intelligence had called the Universe into existence and created man. It is not difficult for me to have this faith since it is incontestable that where there is order there is reason. Order of the Universe is a testimony to the truth of the most magnificent assertion: 'At the beginning there was God'. (cited in 44)

Sincere faith does not reveal itself in the Pharisaic observance of rituals and rites, but in the way humans perceive their fellow human beings and nature, the way in which we adhere to divine and natural laws in everyday life. These laws teach harmony, namely love, moderation, order, spirituality, respect, and self-restraint, all which guarantee safety to us, family, ethnos, and society within the bounds of natural landscapes and habitat.

The thousand year history of the harmonious coexistence of eastern civilisations and nature (India, Tibet, Thailand), as well as the thousand year history of relations between the Indo-European and Slavonic cultures, reassures us of the rightly chosen goal of rehabilitating the Dnipro basin. The shutdown of the Chernobyl nuclear reactor, the establishment of a Trypillian culture centre in Cherkasy Oblast, and the establishment of an Association of the Dnipro Basin Cities in Russia, are a good start and a first practical step in the right direction.

A school of new ecological thought has already been formed in Ukraine, Belarus, and Russia. Its mission addresses the most diverse aspects of the entire problem of the interdependence of people and nature and the harmonious development of their coexistence. The issue now is for this school to gain recognition at both the national and international levels.

The objective of this work is to demonstrate the possibility of an alternative approach to social development on the basis of wholeness and the unity of vital forces of people, society, and the Dnipro environment and to awaken consciousness and a sense of responsibility, as well as natural wisdom, enwrapped in life's misfortunes.

We hope that our sometimes sombre and sorrowful reflections will awaken the desire to find and define our place in nature and to recognise the lack of other alternatives as a way out of the present impasse into which we have driven ourselves, bewitched by our ephemeral powers over nature. We have teachers to learn from, people who continue to live in harmony with nature today, namely the eastern philosophy of life. We have our forebears who deified the forces of nature and the forces of the spirit. Yet, shall we have enough time and patience for another lesson? 'Dead' water (deuterium) has already played a fatal role for the peoples of Russia, Belarus, and Ukraine. We believe that the deadly effects of the 1986 Chernobyl meltdown evoked a reaction from the UN in 1992, as seen by the convening of the Rio Conference. The

Chernobyl catastrophe stirred the consciousness of the world. It inspired the hearts and souls of the peoples of Ukraine, Belarus, and Russia with a burning pain. It placed critical and pressing problems and the reality of failed political measures at the forefront. Our system of values must change. A basin model for the harmonisation of life must be created; a model intergovernmental action plan for the 21st century based on a new philosophy of life for the peoples of the Dnipro basin must be established.

Good which comes from water
benefits all creatures, and
never contests with them

"Anthology of Thought"
Tao: Harmony of Universe

II. SOMBRE THOUGHTS ON A JOURNEY DOWN THE DNIPRO

We are going to take you on an imaginary voyage into the reality of the contemporary life of the Dnipro River and its tributaries. This will be a voyage to contemplate the disastrous outcome of the anthropogenic activity of Homo sapiens during the last one hundred years, which brought its ruinous impact on the primeval virginity of the landscape. This is a voyage of hope, hope that the time-worn waves of Dnipro the Glorious will reawaken and will become hail and hearty again, provided that nations come up with the spiritual energy to harmonise their existence with nature.

In Europe, the Dnipro ranks third, after the Danube and the Volga, for its water catchment area and fourth for its length. The areas of Russia and Belarus, through which the Dnipro flows, constitute 19% and 23% of its basin area, respectively. In Ukraine, the middle and lower sections of the Dnipro have a drainage area of 291.4 thousand square km.

The Dnipro's waters account for almost 80% of Ukraine's total water resources and 57% of those of Belarus. The annual average drainage at the mouth is 53 cubic km. When rains are scarce, the drainage drops to 43.5 cubic km and, in times of drought, it is reduced to 39 cubic km. About 32% of the average annual drainage comes from Russia's territory, 31% comes from

Belarus. Drainage collected within the boundaries of Ukraine averages 19.7 cubic km and during dry spells decreases to 12 cubic km.

Close to 33 million people live within the Dnipro basin area, 22 million of whom live in Ukraine. The cumulative water surface area of the human-made cascade is 7,000 square km, with a total capacity of 44 cubic km. About 70% of Ukraine's water resources are accumulated within this system. Today, it represents an important source of fresh water, which is used for various agricultural purposes.

The water from the Dnipro is used for industrial and agricultural needs, in the housing and municipal sectors, for hunting and fishing, and for transportation purposes. Every year about 17-18 cubic km of water drains from the Dnipro, 50% of which is used in the industrial and energy sectors and 30% by agriculture. About 1.5 million ha of farmland in the Dnipro basin and in the autonomous republic of Crimea is irrigated with water from the Dnipro. The cascade of artificial reservoirs, the lower Dnipro, and the Dnipro-Buh estuary form the bulk of water used for commercial purposes. Commercial and utility usage accounts for 18%. Of the 44.8 cubic km of Dnipro water collected in Ukraine only 8.5 cubic meters reaches the Black Sea. The hydro power stations on the Dnipro have a generating capacity of 10,000 megawatts per hour. But their share of the total energy sector constitutes a modest 3-5%, which raises the question of the rationale of using the river valley at the expense of losing a unique biological resource.

The Dnipro not only supplies water for consumers located within its basin area, it is also a major, and sometimes the only, source of water for large industrial centres. By and large, the Dnipro supplies two-thirds of the entire territory of Ukraine with water, 57% of Belarus (with a population of 6.2 mil.), and also Smolensk, Briansk, and several other oblasts in Russia. This translates to some 30 million people, 50 large cities and industrial centres, some 10,000 enterprises, 2,200 businesses in rural areas, over 1,000 utility companies, 53 irrigation complexes, and four nuclear power stations in Ukraine. The Northern-Crimean canal supplies water to the entire Crimean peninsula. The Kakhovka canal meets the water needs of the eastern part of the Kherson and the southern part of Zaporizhzhia oblasts. The Dnipro-Donbas canal not only meets the needs of industrial clients, the energy sector and the municipal facilities in Donetsk, Luhansk, and Kharkiv oblasts, but it also improves the

environmental status of the heavily contaminated water from the Siversky Donets by mixing it with clean water from the Dnipro. The Dnipro-Kryvyi Rih and Dnipro-Ingulets Canals are used to channel water to the industrial centres in the Kryvbas mining area.

The contemporary Dnipro flows from the Prypiat River's mouth all the way to Nova Kakhovka. The river originates in a modest spring in the Valdai Uplands near the Akseninskyi marsh in Smolensk Oblast (Russian Federation). It then travels for 2200 km before it empties into the Black Sea, running through the territory of Russia, Belarus, and Ukraine. At its headstream, the river is merely a brook, a rivulet with silty banks, which has nothing in common with the powerful image of Dnipro the Wide, which "roars and groans," where "...no ordinary bird can fly half way through its waters." Along the way to the Black Sea, the river "collects tribute" from its tributaries, grows powerful, and makes its entrance into Ukraine as a wide-flowing river starting at the picturesque town of Liubetch on the border with Belarus. The bulk of the water influx comes from the rivers of the Polissya region—the Prypiat, Desna, Teteriv, Berezyna, and Sozh. Eighty-four percent of the river's water is amassed on the territory of Belarus and Russia. The Dnipro has 15,380 tributaries, which amount, in total, to 67,156 km in length.

The following large cities are located in the Dnipro basin: in Russia, Smolensk, Safonovo, Dorogobouzh, and Briansk; In Belarus, Orsha, Shklov, Mogilyov, Bykhov, Rechitsya, and Loyiv (on the Dnipro River), Minsk, Borysov, Bobruisk, and Svetlogorsk (on the Berezina River), Pinsk and Mozyr (on the Prypiat River), and Gomel and Krytchiv (on the Sozh River); in Ukraine, Kyiv, Cherkasy, Kremenchuk, Dniprodzerzhynsk, Dnipropetrovsk, Zaporizhzhia, Nikopol, Energodar, Kakhovka, and Kherson (on the Dnipro River), Chernihiv (on the Desna River), Bila Tserkva (on the Ros' River), Poltava (on the Vorskla River), and Kryvyi Rih (on the Ingulets River).

On the territory of Ukraine, the Dnipro riverbed seems to meander, and is broken into distributaries. The Dnipro carries its waters across the marshes of Polissya, through the forest-steppe and the steppe areas, each of these lending the river its uniqueness. The plains of Polissya are infrequently embellished with sandy hills, dunes, ridges, and boulders accumulated from hydro-glacial activity. It abounds in sandbars and shoals. Navigation is possible for a stretch of almost 2,000 km, up to the town of Dorogobouzh. Artificial canals connect

the Dnipro with the Western Dvina (through the Berezan' water system, built in 1805), with the Neman (through the Dnipro-Neman Canal, built in 1784) and with the Western Buh (through the Dnipro-Buh canal, built in 1848). It encompasses a cascade of artificial reservoirs: Kyiv, Kaniv, Kremenchuk, Dniprodzerzhynsk, Dnipropetrovsk, and Kakhovka, which were built as early as 1961. The original river channel and part of the Dnipro's holms had to be flooded to allow for their construction. It is only in some places in between the reservoirs that the river has preserved its original appearance. Among those are the Bila Tserkva marsh-meadows in Kremenchuk, a part of the Kaniv wildlife sanctuary, and the lower reaches of the Dnipro below the Kakhovka dam. Nowadays, the Dnipro is a deep waterway for river-to-sea vessels delivering cargo to all seaports on the Black Sea and the Sea of Azov. It is clear that the historical trading route 'from the Varangians to the Greeks' has never lost its appeal. Nowadays, people wish to restore it but, as we will explore later, the Chernobyl meltdown has become a major obstacle.

Among all the artificial 'seas' of the Dnipro cascade the most recently built is the one near Kaniv. Lengthwise, it exceeds the Kyiv reservoir, which is located upstream, 1.5-fold, and has a water surface area four times larger. Its steep and rocky right bank is dressed in the verdure of orchards and parks. The picturesque landscape bears a resemblance to a foothill setting. The deep and narrow ravines are covered with hops and other climbing vegetation. The hills rise up to 150 meters. One of those hills bears the name of the national poet Taras Shevchenko, who used to marvel at the beauty of the time-worn waters of the Dnipro. A monument was erected on the grave of the Great Kobzar to commemorate the memory of the great poet.

Downstream from Kaniv the landscape of the Dnipro banks begins to change. The high hills on the right bank disappear: one can see a few small hills, but these are no match in size or beauty for the grand hills near Kaniv. The river flows across flat plains, covered with meadows and forests. Downstream from the mouth of the Ros' river the hills disappear altogether. The stretch between Kaniv and Kremenchuk belongs to the largest of the Dnipro's artificial bodies, the Kremenchuk Water Reservoir. It stretches for 185 km and has a water surface of 2250 square km. From the west, the Dnipro is replenished by water from the Tyasmyn and Ros' rivers, and from the east by water from the Sula and Supiy. Near the Sula the reservoir is 30 km wide. In stormy weather,

waves may reach 3.5 metres in height. Heavy waves, swept by the winds, tumble down on the banks and erode them away further. For the local residents the erosion of these banks has dire consequences. This is yet another example of the adverse impact of the artificial ecosystem.

After Kremenchuk, the Dnipro flows across a vast southern Ukrainian steppe, which is part of a large steppe that is thousands of years old, stretching from the Ural Mountains to the Danube. Downstream lies the Dniprodzerzhynsk reservoir. The river banks are more harsh here compared to the reservoirs upstream. Here, one may come across formations of grey and rare light pink granite, which is part of the Ukrainian crystalline massif. Boulders and rock formations, the so-called pales, are embedded in the very riverbed, although they are now hidden by the higher waters resulting from the construction of hydro-electric dams. According to the Ukrainian archaeologist and historian V. N. Danylenko, the Ukrainian crystalline massif was referred to by the ancient tribes as the "storehouse of vital powers" or *borysthen*. This may serve as an explanation of the origin of ancient names of the Dnipro, also known as Borysphen or Borysthen.

As the Dnipro approaches the town of Orsha, it runs into boulders and limestone formations, which make up the so-called Kobelyatski rapids range, which was destroyed in the early 20th century for navigation purposes.

Below the rapids the Dnipro meets the Black Sea Maritime plains. The river valley here is about 20-30 km wide and the river begins to divide into outlets, forming a multitude of islands. The lower segments of the Dnipro are heavily dependent on the Kakhovka artificial reservoir. It has an area somewhat smaller than that of the Kremenchuk Reservoir, but has 1.4 times the water capacity. Its width ranges from 20 to 28 km. The waterways of the lower and the upper Dnipro are connected by a three-chamber lock system. Locks work in an elevator-like fashion, hoisting and lowering vessels within a distance comparable to the height of a 15-story building. When a ship leaves the locks it enters the lower part of the Dnipro—the Kakhovka artificial reservoir.

The river port and the city harbour in Zaporizhzhia are the entry points for downstream navigation. There are no traces of the original river at this junction. Ships traverse the quiet waters of the Kakhovka Reservoir. Downstream from the city of Kherson, the river, carrying the waters collected from all its tributaries, empties into the Dnipro-Buh estuary, and flows all the way down

to the Black Sea. The flood plain is riddled with numerous streams, where reeds, willows, and other hygrophilous plants grow. This area was known as the famous *Dniprovski plavni* (holms) made up of *Bazavlutski* and *Kinski plavni,* which resemble the *Kozaktskyi Velykyi Luh* ("Cossack Meadow Land"). Nowadays, the area is flooded by the Kakhovka human-made reservoir. It continues to serve as spawning grounds for sturgeon and other valuable fish species.

The ancient Greek historian, Herodotus (490-424 BC), visited the lower part of the Dnipro. He wrote:

> Borysphen is by far the biggest and the richest river in nutrients. It stands above not only Scythian rivers, but all other rivers as well, with the exception of the Nile in Egypt... And it is by far the most beautiful river. It provides lush pastures for cattle, excellent and plentiful fish. The water is clean and it tastes well... It is framed by excellent farmland and tall wild grass grows in non-cultivated areas... Borysphen is home to gigantic fish with no backbone (sturgeon)... and many other things. (cited in 30)

In the anthropogenic interventions made in the Dnipro basin, the lands of the nature reserves are oases of biodiversity and rich nature. The current Podniprovya conservation zone (in the lower reaches of the Dnipro) encompasses over 50 territories and sanctuaries of various access categories and gradings. Twenty-five percent of the assets consist of constructed facilities, which include botanical gardens, parks, landscape gardening areas, etc. Flora and fauna in the forest-steppe and steppe areas in the Dnipro basin are similar to those in the Polissya, Kaniv, and Maritime natural reserves.

The modern Dnipro is no longer a natural source of fresh and clean water. Nor is it a natural ecosystem. Rather, it is a complex biotechnological conglomerate, reduced to absurdity by humans, where the very environment is a hazard for human existence.

The self-regenerative capacity of the Dnipro waterway is not capable of restoring the environmental balance any more. Each year, industry, agriculture, and municipalities discharge enormous amounts of contaminated waste water into the Dnipro. Every year, 5.5 million cu meters of sewage are dumped into the water bodies of Ukraine, which includes 4.2 million. cu meter of contaminated sewage, 2.8 million of which is raw waste. The runoff adds an excessive amount of biogenic and toxic organic matter to water, accumulating

over time in sedimentary deposits with the potential to become a source of secondary water contamination.

Economic activity in the Dnipro basin has developed without adequate economic or environmental considerations for many decades. It resulted in the formation of a sectoral and territorial economy with a dominant fuel-energy sector and metallurgical, defence, and machine-building industries, each of which is a heavy polluter with high energy consumption rates and large irrigated areas.

We have every reason to believe that the most aggressive pollutants of the Dnipro and its reservoir are municipal utilities, ferrous and non-ferrous metallurgy, coking and chemical industries, the machine-building, transport, and energy sectors, and agriculture. Some of the large-scale industrial pollutants include the smelter in Dniprodzerzhynsk, the industrial complex 'Zaporozhstal' in Zaporizhzhia, and the smelter in Dnipropetrovsk. During the period of transition to a market economy the country has gone through a difficult time, where the water treatment facilities, enterprises, organisations, industrial storage tanks, and agricultural effluent reservoirs have discharged an increased amount of raw untreated waste.

The following are some of the complex environmental issues arising from commercial activities in the Dnipro basin over the last decades: construction of the cascade of reservoirs; network of irrigation channels; colossal water withdrawal to accommodate industrial and communal needs; huge volumes of sewage runoffs; pollutant runoff from the agricultural industry; and water transport impact, to name a few.

The artificial reservoirs and canals made it easier to supply water to industrial and agricultural centres in Ukraine, where water resources were practically depleted. However, the management objectives were met at the expense of environmental targets: the equilibrium of the Dnipro-Black Sea ecosystem was disturbed, the drainage conditions were changed radically, and the fresh water runoff to the Black Sea was reduced, which depleted the surface layer of the Black Sea. The situation was aggravated by the construction of reservoirs on the Don and Kuban rivers in Russia, which triggered a range of other negative impacts.

The reservoirs of the Dnipro cascade are subject to severe technological environmental strain. They accumulate every type of contaminant, which

comes from the water catchment area. The cascade pattern prevents natural factors from maintaining environmental balance in all the reservoirs, except the upper one—the Kyiv Reservoir. Going downstream from the upper to the lower Kakhovka Reservoir, one may notice that natural drainage is losing its significance, while the internal factors are on the rise, which again confirms the fact that reservoirs are turning into natural cesspools. This is specially evident in the Dnipro and Kakhovka Reservoirs, which have registered a significant increase in the amount of blue-green algae, manifesting itself through so-called water 'blooms'.

Regulation of river runoff and its territorial distribution through the Dnipro cascade is an important issue and will remain relevant in the regeneration of water resources and water supply. Nevertheless, the status of reservoirs is a public concern, as it may determine whether ecological problems of the Dnipro will be resolved. The point is that the creation of the Dnipro reservoirs resulted in the flooding of a considerable land area and caused changes in the hydrological, hydro-chemical, and hydro-biological conditions. Functional and structural changes turned the ecosystem from a river type to that of a river-lake type, which slowed down the water exchange and self-regeneration rate and increased water loss due to evaporation, infiltration, etc. Proposals have been submitted to gradually drain the artificial reservoirs to restore the Dnipro to its original state and to begin using the flooded areas as farmland.

However, as research indicates, draining the reservoirs will have catastrophic implications for both the economy and for the people. Losses in the budget incurred from de-commissioning half the industrial capacity of the major utility, transport, and other enterprises, as well as decreased productivity of irrigated lands, may ruin the national economy. Furthermore, the Dnipro's sanitary and epidemiological conditions will deteriorate due to radioactive contamination of the reservoir bed sediments. If the latter accumulate on the hydro-dynamically unstable silt sediments, a re-distribution of radionuclides may be triggered. Reservoirs' drainage could accelerate this process and a secondary radioactive contamination could occur in the newly restored land covered with non-deactivated and non-reclaimed radioactive silt. It is therefore unlikely that the rehabilitation of the Dnipro and its reservoirs will come from phased-in drainage. It would result in miniscule economic benefit compared to forecasted consolidated losses.

In the areas bordering the artificial reservoirs inundation and flooding of land continues to be a factor. The unprotected areas affected by the reservoirs cover 90 thousand hectares and the unprotected shallow water area accounts for 133 thousand hectares. Nowadays, about 100 towns and urban settlements are inundated, which is related to other adverse factors like the transformation of lands, degradation of flora and fauna, silting, swamping, and water enrichment.

The environmental situation in the Dnipro basin is aggravated by increased erosion and river bank deterioration. Tilling of the soil up to the water intake points reached 65%. In Kherson Oblast and in river basins of some small rivers it is as high as 80-85%, while the norm is 40%. The afforestation of territory runs an average of 14% compared to the standard of 30%. Over the last 25 years, the area of eroded lands has increased by 28% and the total humus content in the soil has declined by 10%. Erosion affects water bodies and it increases silting and contamination with organic compounds and mineral fertilisers, specifically with nitrogen and phosphorus.

Small rivers in this basin, which account for more than 90% of its fluvial net and which determine the health status of the Dnipro River itself, are under extreme anthropogenic strain. The annual water intake from small rivers may reach 2.1 cubic km. The small rivers meet 18% of all the economic needs in the Dnipro basin. This fine hydrographical network absorbs 15% of all sewage and 6% of contaminated water dumped into the river basin. Almost half of the Dnipro's tributaries are polluted with chlorine organic pesticides, whose levels exceed admissible concentration limits for fish farming purposes.

Surface runoffs from agricultural properties, farms, and cattle farms contaminate water reservoirs. Contaminated subsurface water and discharge from urban and rural centres aggravate the situation. Drainage from the irrigation system is a powerful source of contamination by pesticides, herbicides, and mineral salt pollution. Annually, 19.1 thousand tons of nitrogen, 0.63 thousand tons of phosphorus, and 0.118 thousand tons of pesticides are washed away from the Dnipro basin.

There is practically no water-protection zone where appropriate practices are abided by. Arable land in these zones is ploughed to the point of water intake. This is where livestock farms, summer enclosures for cattle, and centres for the production of mineral fertilisers and pesticides are located. Aggressive

ploughing, excessive growing of tilled crops, and insufficient afforestation in the water intake zones increase the erosion process and lead to muddying and contamination of rivers and water bodies. The problem is aggravated by the fact that in the last few years river banks and flood plains have been allotted for dacha construction, orchards, and vegetable gardens. The system of irrigation has resulted in the mineralisation and salinisation of soil, a decline in soil fertility, and flooding of territories. This brings us again to the absurd result of the reckless activities of an ecologically irresponsible society.

Not long ago, about 23,000 tons of fish was harvested annually in the Dnipro. The share of valuable fish species—bream and zander—accounted for 16% of the total catch. The 1990s registered a decline in fishing stock both in the Dnipro and other bodies of water in Ukraine, which is reflected in the reduced quality and quantity indicators in fishing and other related industries. The annual catch in the Dnipro reservoirs decreased to 8,800 tons in the lower part of the Dnipro. It shrank by 3.2 times in the Dnipro-Buh estuary, which is the equivalent of 2,600 tons. The basic factor which brought this about is water contamination, disturbance of the natural cycle of the hydrological regime of the reservoir, the lack of efficient equipment designed to protect fish stock at the vast majority of water intake facilities, and the insufficient scale of piscicultural amelioration.

Virtually no forest conservation measures are observed. Regulatory non-compliance has resulted in a situation where water protection zones no longer perform their function as buffers against contamination. Instead, they themselves become the sources of pollution.

The situation across the regions, due to poorly designed and environmentally unsafe water management practices in the larger part of the Dnipro basin, is dire. Ninety-four percent of towns, 50 percent of settlements, and about three percent of villages in rural areas have centralised sewer systems. The carrying capacity shortage of bio-treatment facilities in cities and towns constitutes 442 thousand cubic meters per day. About 2,160 km of emergency sewer lines require replacement. Zhytomyr, Zaporizhzhia, Rivne, and Cherkasy Oblasts (all in Ukraine) have no mechanical wastewater purification facilities. Moreover, the low efficiency of existing water treatment stations contributes to the adverse impact on the Dnipro. In particular, the centralised biological treatment facilities perform insufficiently, containing mostly industrial wastewater

that enters the facilities without preliminary purification. In essence, there are no local treatment facilities in the Dnipro basin capable of desalinating the water or removing the excess mineral substances.

The excessive anthropogenic strain was intensified after the Chernobyl power plant accident, during which radionuclides were released into the environment, disturbing the balance of nature and resulting in the deterioration of water resources potential, culminating in an ecological emergency in the Dnipro basin. The problem of run-off and the appearance of strontium-90 in the Dnipro reservoirs remains of primary importance (incidentally it remains in water as a soluble). Every year spring floods increase its content in the waters of the Prypiat River and the Kyiv Reservoir. Most radionuclides are accumulated in the Kyiv, Kremenchuk and Kakhovka Reservoirs. All radionuclides, with the exception of iodine and strontium, settle very rapidly into the riverbed sediments, which formed as far back as the nuclear meltdown in 1986. Nowadays, Ukraine's radiological and sanitary situation on the Dnipro cascade appears safe for the population and economy. The content of radionuclides in the water and in fish is under permissible levels. It approaches guideline values only during certain times of the year and in certain locations. With regard to strontium-90, it slightly exceeds the guideline indicators.

All the above-mentioned factors have resulted in the degeneration of the entire ecosystem of the Dnipro basin, and, in particular, in a significant deterioration of water quality. The original quality may never be restored. Water in most of the rivers is chemically contaminated. The river segments downstream from big industrial centres, cities and industrial enterprises are heavily polluted. Large and particularly old cities that stand on small rivers discharge uncontrollable solid and liquid waste into the rivers. The storm wastewater and surface water is drained from industrial areas into the small rivers. Water in these rivers resembles water from the ditch or an open sewer, which means that, in essence, those rivers have become natural open sewer collectors. But the path to restoration can only come about as a result of a consistent national policy, through a well-integrated regeneration process, and the optimisation of resources management.

The contemporary Dnipro basin features not only a degraded ecosystem and defaced landscapes that once used to catch the fancy of foreigners as strikingly rich and beautiful and provide the local ethnos with every type

of natural resource. We are not only talking about the reservoirs, canals, cities, industries, and power stations. The Dnipro basin comprises numerous landmarks which go back thousands of years in history. It is the birthplace of the cultural values of the nations that used to live there and continue to live there today, forming its spiritual essence. If we fail to restore these spiritual treasures, we will never attain the environmental rebirth of the Dnipro, nor the harmony of its vital powers.

Yet, Borysphen is the most beautiful river of all.

Herodotus (4th cent. B.C.)

III. THOUSANDS OF YEARS OF *PODNIPROVYA* (THE LANDS ALONG THE DNIPRO)

The great Slavic Dnipro River has flowed for many centuries. The memory of its age is etched on the lands throughout which it wanders. It is documented in the research work of historians and archaeologists. It is portrayed in epics, legends, myths, fairytales, and songs of the peoples who have inhabited these lands from primordial times and which are to be found in ancient chronicles and in the reminiscences of minstrels and writers. The glaciers laid a long, meandering path in the time of antiquity (17 to 23 thousand years ago), which extended from the lands of the present day Dnipropetrovsk towards the north. This eventually was transformed into untamed streams, then into nameless rivers and, then into the Dnipro and its tributaries.

Approximately ten to twelve thousand years ago, the earth experienced significant geographic-climatic changes related to global warming. It was the beginning of a new geological epoch, the Holocene epoch, which continues till the present day. [46]

Throughout the next several thousand years, the Dnipro water system developed according to the earth's natural evolution and climatic changes.

Writings by Phoenician and Ancient Greek travellers tell us that in the 7th to 6th centuries B.C. the climate was somewhat cooler. The temperature of the air was lower and the humidity was higher than it is today.

There is also evidence showing greater aridity on some parts of Ukraine's territory in the 6th century B.C. During the excavation of a barrow situated near Vasylkiv, Kyiv Oblast, evidence that indicates that the level of ground waters around the burial mound were much lower then than now was discovered.

In the 5th century B.C., Herodotus described the river network of the area which now forms part of Ukraine and Russia. The following eight major rivers existed: Istr (Danube), Tyra (Dnister), Hipanis (Southern Buh), Borysphen (Dnipro), Pantykapa (Konka), Hipakirys (Kalanchak), Herr (an unidentified river of northern regions along the Sea of Azov), and Tanais (Don). Large ships sailed these rivers entering them from the sea.

Nestor, a chronicler of the time, produced an interesting analysis of the region's hydrography in the chronicles *Tales of the Bygone Years.* He wrote that the rivers in those times were broad, deep, and convenient for navigation.

In the 5th to 4th centuries B.C., the territory of contemporary Ukraine experienced regular periods of drought. The water level in these rivers was very low. Small rivers that had flowed into and fed the Dnipro became very shallow. 76

In the late 4th to 3rd centuries B.C. the climate changed again and it became more humid. Frequent precipitation raised the level of waters in small rivers. Water accumulated in all parts of the river plains. Peat bogs and a fertile layer of soil, the humus, were formed.

The 2nd century B.C. was again a period of droughts. A shift from south to north occurred in physico-geographical belts. The water levels of the rivers in this period were low. At the beginning of the 1st century B.C., especially beginning from the 8th century B.C. on, periods of unusually higher water levels of rivers became noticeably longer. This was the period when Lake Nobel, Liubiaz', and others formed at the lower reaches of the Prypiat River. It was also the time when the many lakes at the lower reaches of the Siversky Donets River, which are situated in the proximity of the Dnister basin, Southern Buh basin, and southern tributaries of the Prypiat, namely the Horyn River, were created.

Between the 2nd century B.C. and the 2nd century A.D., the waterbeds of small rivers were deep. The forest-steppe belt penetrated the contemporary steppe zone of Ukraine, forming a deep wedge. River valleys were filled with the rustle of large hygrophilous forests, which in certain regions extended as far

as the Black Sea and Crimea. Bones of beavers, otters, and other animals were discovered in these regions, which is characteristic for this type of fauna. 76

Journals and chronicles of various travellers, as well as other sources of information, attest to the abundance of water in what are today but small rivers. We find that many rivers, including the rivers of the steppe belt, were navigable in earlier times. Merchant and fishing vessels sailed the Samara, Vovcha, Krynka, Kalmius, and other rivers, which today are drying up. There is evidence that the rivers of the forest-steppe and mixed-forest (Ukrainian Polissya) belts in particular had abundant waters. This assertion is supported by historical facts, namely, in the summer of 1259, the Tatar hordes were unable to conquer the city of Lutsk because the water level of the Styr River had reached such heights that they could not traverse it. 76 We know from the journal of Erich Lassota von Steblau, an Austrian diplomat, that in 1594 the water volume of the Stuhna and Ros' Rivers was immense. On June 14 of that very same year, Lassota von Steblau was only able to cross the Rastavytsia River (a tributary of the Ros') with enormous difficulty. This river today is no more than a shallow creek.

We have interesting information provided by Guillaume Le Vasseur de Beauplan, a great French traveller, who had visited these regions at the beginning of the 17th century. Apparently, the Zapporizhzhian Cossacks used the Samara-Vovcha-Krynka-Mius water system to enter the Sea of Azov when the Dnipro estuary was blocked by the Turk enemy forces.

The Ingulets' also used to be a large river. Its drainage today is approximately 2.5 to 3 m^3/sec. The river's name is suggestive of its nature, deriving from *iyen-kul,* which in Turkish means "large lake". Even today, one can make out the vestiges of a lake.

In the book *History of Zaporizhzhian Cossacks* (1847), one finds that between the Khortytsia and the estuary on the right side, 30 tributaries flowed into the Dnipro, while along the left side, 23, and below the Konka River, 16. At present, many of those rivers have disappeared. Their names were inherited by the local settlements: Rusynova Balka, Rohachyk, Kaiiry, etc.

There are some general characteristics of various natural-climatic epochs of the present-day Dnipro basin which have been developed using different historical sources. [5, 10, 11, 33, 34, 46] In Europe, the final phases of pre-historical anthropogenesis occurred in the severe climatic conditions of periodic

glaciations: Günz (one million-700 thousand years ago), Mindel (500-350 thousand years ago), Riss (250-100 thousand years ago), and Würm (70-10 thousand years ago). The last glaciation reached its maximum only 20,000 years ago. Almost one-third of the land was covered with ice. At that time, a solid ice massif reached the geographical latitude of Dnipropetrovsk. Natural zones consisted of the near-glacier cold desert, forest-steppe, and steppe. Simultaneously with the cyclic glaciations, intensive earthquakes and disastrous floods may have occurred.

Is there a connection between the biblical story about the Deluge and the melting of glaciers? The results of modern research indicate that it is possible to see the connection between legends and catastrophic events. It is worth remembering that as glaciers retreat slowly, diminishing pressure on the earth's shell, they leave behind gigantic, non-drainable water bodies. This process triggers a spike in seismic activity on the territories freed from ice. This is why earthquakes are often associated with catastrophic floods, described in the biblical myths, sagas and religious beliefs of Europe and the Americas. The most devastating flood took place around eight thousand years ago, when Agassiz Lake broke through the ice and emptied northwards into the Hudson Bay. According to the estimates of experts, the amount of water was enormous—it raised the level of the oceans 20 to 40 cm. The tales of North American Indians also tell us about the deluge.

The Black Sea is another example. It was cut off from the Marmora and the Mediterranean Seas and it was 100 meters below its current level. The prominent historian Diadorus Siculus (1st century B.C.) wrote about the formation of the Dardanelles and the Dardan flood, which was presumably caused by the water from the Black Sea as it rushed into the Mediterranean through the Bosporus and the Dardanelles. Geophysics data speak in favour of this event, [41] which was of crucial importance in the life of ancient civilisations. It is reflected in the myths and legends of various nations. In reality, the water emptied into the Black Sea, whose water level rose by 100 meters. This flood is a relatively recent event. It was a time when the first Greek and Scythian legends appeared. Those nations lived close to the coastline of the Black and Marmora Seas. The Black Sea flooded about 100-200 km of maritime coastline. This is how the Sea of Azov was formed, while many ancient settlements were buried under the sea.

Eschatological descriptions in the legends of many cultures contain amazingly similar details. It occurs as a result of engrossing fire (eruption of volcanoes) and gushing floodwater. This is exactly how the end of the world was envisioned by the ancient Slavs. During Shrovetide celebrations in March, they sang songs about the Great Flood. Flood periods in ancient times were regarded as a reminder about the Great Flood which came from Rod-Swaroh-Perun, who was revered as the most superior heavenly deity. Slavonic sorcerers warned people about the necessity of observing rituals or else flood periods would never cease and the deluge would return again. The ecological and philosophical message of the legends is that it is dangerous to take nature's warnings lightly. The same goes for the wisdom of customs and ancient beliefs: one disregarded them at the risk of catastrophe. Modern environmental crises are just another proof of the old wisdom. Today, Ukraine is on the verge of major crises—the inundation of large areas which may come in the wake of the completion of gigantic projects that may disturb the natural flow of Dnipro water and its ecosystem.

In the past, climatic fluctuations and changes in the landscape resulted in the disturbance of water balance, flora, and fauna. As the climate became colder, thermophilic plants and animals either disappeared or migrated to warmer lands. Tribes and nations also migrated as they adapted themselves to the changing environment. This great migration of nations was especially dynamic in the areas of the fertile soils in the Black Sea maritime area and in the Dnipro basin. History reminds us that many nations, cultures, and beliefs came and went prior to the ancestors of the Ukrainians, Russians, and Belarusians, the ancient Slavs, who settled in the Dnipro basin.

The lands along the Dnipro are saturated with the spirit of numerous civilisations that succeeded one another from the East as well as the West. The images of Artemis and the Gorgons, Demeter and Persephone, as well as Athena and Zeus, have been found to originate in the Trypillia culture. Contemporary factual research will be of primary importance in determining the spiritual identity of the Indo-European cultural settlements, as well as the mysterious relationship between the Slavonic, Hindu, and Greek cultures. It will solve the riddle of the Scythian Hellenes, the mystery of the Helons of the Dnipro lands and their Dionysian cult, as well as other manifestations of Greek myths and rituals of unknown origin.

In ancient times, the Dnipro was known as a transportation route connecting the peoples of the Baltic, Black, and the Mediterranean Seas. The famous route from the Varangians to the Greeks played an important role in the history of Kyivan Rus. Another not so well-known route was from Bulgar to Kyiv, which went down the Dnipro and further by land to foreign lands. Some one thousand years ago this route connected the peoples in the Volga area (the Volga Bulgaria) with those living in the Dnipro basin. In their monograph *Bulgar-Kyiv* (1997), historians A. Motsya (Ukraine) and A. Khalikov (Tatarstan) do not rule out the claim that the surface-river route from Bulgar to Kyiv was part of the Great Silk Road to Europe. [51]

Below is a general chronology of the millennial history of ethnic cultures and civilisations in the Dnipro basin, compiled by authors who relied on available research. [10, 11, 24, 74] There is a certain difficulty in completing a systemic work of this sort due to the temporal and geographical overlap of many cultures and their historical stratification.

According to Ukrainian historians P. P. Tolochka, D. N. Kozak, O. P. Mots', and others, the flora and fauna that existed during the time of the late Indo-Europeans enables us to identify the location of their ancestral land. It was located in the moderate zone between the Rhine and the Volga. Modern historians are unable to explain the appearance and then the disappearance of the fifteen hundred-year-old Trypillian culture (4000 - 2500 B.C.) from the country between the Dnister and Dnipro Rivers, nor are they able to explain the disappearance of those ancient cities with Indo-European features.

Beginning in the 19th century new hypotheses about the origin of the Indo-Europeans and Aryans were suggested. [10] A German geographer, K. Ritter, pointed out the similarity between the words *India* and *Indika*, the name of the Kuban lowlands and the Taman' Peninsula in the times of the ancient Scythians. Based on this observation, Ritter assumed that Aryans migrated to India from precisely these lands. This assumption fully agrees with the myth about the migration of Veddoid people from the Black Sea coast to India, led by the Great Blessed Rama. He was the commander and spiritual leader by virtue of his spiritual force, ingenuity, and kindness. Edward Schure narrates the following legend in his essay *The Great Initiates*: "All these legends, like radii of one and the same circle, point to a single common centre... the first

Creator of the Aryan religion, who rises from the woodlands of ancient Scythia in a tiara of both the Conqueror and the Blessed, and holds a mystical fire in his hand, a consecrated fire, which will enlighten all Aryan peoples." [83]

During World War II, an Austrian linguist, P. Kremer, arrived at the same conclusion and compared the "New Syndic" of ancient authors with the "Old Syndic", which was located in the lower reaches of the Dnipro. Were it not from here, then, that the Aryans migrated, long before the appearance of the Scythians or the Greeks? O. Schreider, a German linguist, as well as H. Child and K. Sulimyrsky, English and Polish archaeologists of the pre-war years, believed that the ancestral land of the Indo-Europeans and the Aryans was located in the steppes of the Black and the Caspian Seas. Until recently, M. Chymbutas, an American researcher, has supported a similar theory.

It is important to note that in the 1950s V. Heorhieva, a Bulgarian philologist, and Danylenko narrowed down the location of the ancestral fatherland of the Aryans and the Indo-Europeans to the lower reaches of the Dnipro. [24]

Later on, the issue of the Indo-European community became significantly more complex, since it intertwined with the Arat and Sumer question. Fundamental research by Ukrainian and Russian philologists and archaeologists has confirmed that the original ancestral land of the Aryans was located in the lower reaches of the Dnipro. A link has been established between their culture and the Trypillian culture. The study of burial mounds located along the lower regions of the Dnipro have provided the following three categories of data that support the given hypothesis: belongings, tombs, and embankments. The barrow near Velyka Oleksandrivka and the adjacent Starosillya (the country between the Ingulets' and the Dnipro Rivers) indicates more distinctly than other barrows the presence of an Aryan tribal community due to the contact between Arat and Sumer, the wandering priests (a contemporary geographical map of Poltava Oblast shows that there is still a small river and locality, by the name of Artopolot). [24]

Yet the most impressive evidence is the archaeological findings in the Kamiana Mohyla (Stone Barrow) on the river Molochna (left-bank, the Dnipro lowlands) dated from the 7th century B.C. The clay tablets with pre-Sumerian characters that were discovered there point to a historical connection between epochs and peoples. They also provide evidence of the great ancient civilisa-

tions in what is today Ukraine. They convincingly confirm that the Dnipro basin is a cradle of three Slavonic nations whose roots extend ten to twelve thousand years into the past.

The discovered stone tablets—pre-Sumerian writings—attest to the historical connection between the cultures of the lands between the Danube and the Dnipro and the Tigris and Euphrates basins. (The mystery of the names of the Samara River, a tributary of the Dnipro, and the city Samarra on the Euphrates is certainly worthwhile mentioning.) A connection has also been established between the cultures of the Kamiana Mohyla territory and the contemporary Turkish settlement of Chatal-Huyuka. The English archaeologist J. Melart had excavated a priests' quarters of the earliest Indo-European settlement near Chatal-Huyuka. The Indo-Europeans had developed exceptional farming skills, social structures, and myths and rituals. The priests of Chatal-Huyuka paid periodic visits to Kamiana Mohyla to conduct mythical rituals. Each time, they read the writings of the clay tablets in order to enrich their knowledge with the wisdom of their ancestors. (Today it would also benefit our spiritual forces to visit the burial sites of our ancestors in the Dnipro basin.) Danylenko was the first to decipher the mythical rituals of the earliest Indo-European cultures of the 8th to 3rd centuries B.C., beginning with the Chatal-Huyuka and Starchev to the Kukuten and Trypillia. He demonstrated the existence of a similarity between theirs and the Sumerian, as well as the Greek (more precisely Pelasgian) mythical rituals.

From approximately 12,000 to 10,000 B.C., a new historical epoch began in the lands along the lower reaches of the Dnipro—the Mesolithic period. Archaeologists and historians have concluded the presence of three anthropological types in the area above the Dnipro rapids during the Mesolithic period—Early Mediterranean, Proto-European, and Mixed, which evolved due to the assimilation of the former two. The process of anthropological formation of the Mesolithic community of the Dnipro regions went on for several thousand years—thrusts and waves of migration occurred from the north, south, east and west.

As stated in the book *The Ancient History of Ukraine,* [10] complex mythical concepts of the Mesolithic settlements were embodied in *Churingas* (stone plates with engraved or painted characters), which were found in Kamiana Mohyla, and the Crimea. The burial mounds above the Dnipro rapids (Voloske,

Vasylkiv I and III), as well as the archaeological findings along the Molochna River with the cultural centre in Kamiana Mohyla (7th millennium B.C.), were traced to this period. Subsequent tribes left their magical artistic 'autographs' on the sandstone of Kamiana Mohyla, which were transformed into a unique stone chronicle of travelling priests of the Circumpontic zone and are believed to have a relation to Sumerian cuneiform.

The area of the Dnipro valley near Kyiv supposedly played a major role in establishing inter-ethnic contacts. From the 3rd millennium B.C., it was well known for its advantageous location. The extensive river system of the upper-Dnipro, Desna, and Seim Rivers took travellers to the Don and Oka Rivers. In the north, one could travel down the watercourse as far as the Volga (which the ancient Aryans called Ra or Ras). The tributaries on the right bank led to Daugava. In the west, the Prypiat and its tributaries reached as far as the Western Buh and the Neman. All these waterways joined together at the Dnipro's main watercourse (also known as Slavuta, Danapras, and Borysphen) near the hills of the city of Kyiv. It is through here that the important trans-European land route ran. The route's western segment connected Kyiv to the Hungarian flatlands via mountain passes in the Carpathian Mountains. Its eastern part led to Kazan, the Volga lands, and the territories in the area of the Ural Mountains. This is why the Dnipro basin near Kyiv had a special appeal to ethnic groups with such varied practices.

In the 11th century B.C., the earliest monuments of the Catacomb culture (the manner of burial in vault-tombs underneath barrows) appeared in the regions along the Sea of Azov, which belonged mostly to the Aryan tribes. It is presumed that local *Yamna* tribes, as well as North Caucasian tribal groups, were part of its formation. In the 10th to 9th centuries B.C., the 'catacomb people', who consisted largely of the Indo-Aryans, had spread to the left bank, then into the many steppe and forest-steppe regions of the right bank. In the 17th to 16th centuries B.C., Indo-Iranian tribes of a multi-roller culture, the name of which is connected with the tradition of decorating ceramics with braided rollers, had settled in the steppe and the forest-steppe zones between the Don and Prut Rivers.

In the 11th to 10th centuries B.C., the forest-steppe region in right-bank Ukraine was inhabited by the agricultural tribes of the *Bilohrudy* culture. The Bondarokhyn culture existed in the mixed-forest and the forest-steppe belts

of the left bank (13th to the 8th centuries B.C.) and is connected to the Finno-Ugrians.

In the 10th to 7th centuries B.C., the Chornolissya culture grew strong, giving rise to our ancestors of eastern Slavonic origin. They lived in the area from the mid-Dnister to the mid-Vorskla (a Dnipro tributary). A noted linguist, A. Trubachov, concluded that the majority of archaic Slavic hydronemes are associated with territories which are located in the forest-steppe Dnipro valley and the Vorskla basin, whence the Chornolissya archaeological culture had originated. At the beginning of the 8th century B.C., the Chornolissya ethnic group began to migrate northward. It partially assimilated with the local Bondarokhyny population, which later gave rise to the community of Budyny. The contacts between Baltic tribes and communities of ancient Slavs, who were related to Scythian farmers, grew strong.

From the 7th century B.C. to the 3rd century A.D., the Dnipro estuary region (Berezan Island) was colonised by the Greeks originating from Ionia. The Ionian State, Olvia, had existed at the same time as Great Scythia and had lasted one thousand years. A new Helleno-Scythian stage in Dnipro lowlands history evolved. On the territory of Belske, in an ancient town (Poltava Oblast), which was the location of the legendary capital of the forest-steppe Scythian Helon tribes depicted by Herodotus, some relics have been found—an antique ring made by an Ionian craftsman, as well as Phoenician perfumes phials. The ancient Greeks had contact with the Finno-Ugric and Irano-lingual population during the Scythian era.

In the 6th century B.C., the Iranian-speaking tribes of the *Zrub* (in Ukrainian it means "log") culture had spread from the east to left-bank Ukraine. They are known to have buried the dead underneath barrows in hewn wooden coffins, stone sarcophagi, and rectangular pits covered with wood. Throughout the next centuries, the *Zrub* peoples occupied huge territories, from the Dnister in the west to the Urals in the east, and from the Kama, the middle of the Oka, and the Desna up to the steppes along the Caspian Sea coast and the Crimea.

Researchers consider the great period between the 6th and early 4th centuries B.C. to be the Neolithic epoch. The transition from domestication to crop growing is characteristic of this period. Relics from the Neolithic period are found mainly in the regions above the Dnipro rapids, along the coastline of the Sea of Azov, and in the Siversky Donets region. They belong to a south-

ern group of Dnipro-Donetsk tribes, amongst which several archaeological cultures are recognised, including the Proto-European and Early Oriental anthropologic types.

There are close to 60 archaeological cultural sites from the Neolithic age in the Dnipro basin belonging to the following groups: Kyiv-Cherkasy (Dnipro shoreline, Psel, Sula), Lyzohub (Desna), Azov-Dnipro (Nadporozhzhia—above the Dnipro rapids), Verovkin (Sula, Psel), and Sursk (Nadporozhzhia). In the Kyiv area the sites are located in Nikolska Slobidka, Vyshenky, Vita Lytovska, and Bortnychi; in Zaporizhzhia on Surskyi and Kodachok Islands. This is the epoch of origin of the Trypillia culture and its ancient cities, perhaps the earliest in Europe. 16 The Seredniostohiv culture (Dereiivka, Oleksandiya) originated at about the same time and was possibly the earliest culture in Europe to perform burials of domestic animals, specifically, the horse. The concept of life, death, and birth of the ancient peoples is reflected in their burial customs. Death was conceived as a transition into another form of existence. The graves in the Neolithic period did not have barrows, which is characteristic of the epoch. Today, the burial rites of the ancient settlements in the Cherkasy and Nadporozhzhia (above the Dnipro rapids) regions have been well studied.

The late 5th to the 3rd centuries B.C. are known as the Eneolithic Period. Tribes of the Trypillia culture inhabited the right bank of the Dnipro, as well as parts of the left bank along the middle of the river. They were involved in agriculture and animal husbandry. The forest-steppe and the steppe zones of the left bank were inhabited by tribes of the Seredniostohiv culture and the steppe zone along the Black Sea coast was inhabited by the Kemiobin culture. The Trypillia culture, which existed for 1,500 years in the lands between the Dnipro and the Dnister Rivers, mysteriously disappeared. In the middle of the 4th century B.C., the animal-raising tribes of the Seredniostohiv culture intensively settled on the left bank of the Dnipro and along the Siversky Donets basin. Some historians regard this settlement as the first appearance of Indo-Europeans on the territory of contemporary Ukraine. Anthropological research supports the theory of close contact between the Seredniostohiv and Trypillia cultures.

A significant number of landmarks in the Dnipro basin originate from the early stages of the Eneolithic Period (4th century B.C.). They represent the mid Trypillia culture (Trypillia, Shkarovka, Kolomyishchyna, Verem'ya,

Hrebni, Myropillia, and others), the Lendel culture (Prypiat basin), the Stohiv culture (Khortytsia, Seredniy Stih, Zolota Balka), the Yamna-Hrebni culture (the Desna basin, Psla, Sula), and others. From the end of the 4th to the first half of the 3rd centuries B.C., intensive settlement along the lower reaches of the Dnipro occurred. Altogether, 160 cultural sites in the Dnipro basin come from this period, represented by the late Trypillia (Kyiv-Cherkasy region), Dereiiv, and Nyzhniomykhaylivska cultures.

In the 3rd century B.C. the lower central regions along the Dnipro witness settlement of the peoples of the *Yamna* and the *Kemiobin* cultures. This period also marked the end of Scythian domination. The Sarmatic tribes, which earlier wandered along the Ural Mountains and the Volga River, approached from the east. During the first centuries A.D., some Sarmatian peoples penetrated deep into the north (Tyasmyn basin), where they soon assimilated with the local agricultural community.

In the middle of the 3rd century B.C., the tribes of the Kemiobin culture settled along the lower reaches of the Dnipro, Southern Buh, and Crimea. They are believed to have originated in the Northern Caucasus.

In the 3rd to 2nd centuries B.C. the nomadic tribes of the Sarmatians, Yazygy, and Roksolany ousted the Scythians. The Slavonic ethnos took shape mostly in the area between the Vistula and the Oder. The Zarubinets culture played a major role in shifting the centre of Slavic history to the area between the Vistula and the Dnipro. The rule of the Sarmatians ceased with the invasion of the Goths.

In the last quarter of the 3rd to the first half of the 2nd centuries B.C., the left bank and certain parts of the right bank of the Dnipro were inhabited by the crop-growing and animal-raising tribes of the *Yamna* culture (the name derives from the burial rite, in Ukrainian *yama* means 'pit'). Afterwards, the Yamna peoples settled along the Black Sea coast and spread to the Balkans. At that time they inhabited a great portion of land between the Volga and the Danube. These enormous migrations marked the end of the 'Indo-Europeanisation' of Ukraine's territory. The greatest concentrations of Yamna settlements are known to have existed north of the Sea of Azov and the Black Sea, and between the Don and Danube Rivers. From here on, along the Dnipro and the Prypiat Rivers, towards the Neman, Vistula, and Oder Rivers another culture settled, the Pre-Germano-Balto-Slavs. The Pre-Celto-Illiro-Italics

moved from Podillia westward through the Carpathian mountain passes. The Pre-Greek-Armeno-Thracians progressed from the western regions along the Black Sea coastline, southward past the Danube. The people who remained on the territory between the Dnipro and Volga Rivers were the forebears of the Pre-Indo-Iranian branch of the Indo-Europeans.

Danylenko wrote that the greatest significance of the Eneolithic Period as a historical epoch is the fact that, at its conclusion, humanity had crossed over into a new era of development. New nations appeared, which until then had formed an indistinct conglomerate of Indo-Europeans. 24

During this period, the first grave mounds were built near what is now Kyiv. From the time of the Eneolithic epoch, the Kyiv heights began to attract the mightiest of cultures (Trypillia, Yamna). The hydronemy of the Kyivshchyna (Kyiv regions) attests to this fact by preserving a Slavic, Iranian, Illirian, Baltic, and Germanic ethnic mix.

Only the Dnipro basin preserves the Pre-Scythian, Iranian (Aryan) names of rivers: Apazha, Apaka, Artapolot, Asman', Vorskla, Domotkan', Esman', Rat', Reut, Samotkan', Svapa, Syev, Seim, Sula, Sura, Udai, Khox, and others.

The 2nd century B.C. marked the beginning of the Bronze Age in the southern part of Western Europe, which lasted almost one thousand years. During this time, four cultures superseded one another throughout the regions of Ukraine. Ukraine's population increased ten-fold during the Bronze Age, which was an epoch of active interaction among various ethnic groups, namely eastern groups of Indo-Europeans, Indo-Aryans, Pre-Thracians, Finno-Ugrians, and Pre-Slavs, who developed throughout subsequent historical epochs.

In the first quarter of the 2nd century B.C., the northwest region of Ukraine was inhabited by tribes of the 'rope ceramic' culture. Many scholars believe that the peoples of this culture belonged to a group of Indo-European tribes, which also included the ancestors of the Germans, Balts, and Slavs. The direct descendants of the 'rope' peoples are thought to have been the 'Tschynets-Komarov' cultures, who were spread over the northern regions of right-bank Ukraine, in the near-Carpathians, along the upper- and mid-Dnister, and in the southern part of Belarus. Many historians associate the 'Tschynets-Komarov' cultures with the beginning of the Pre-Slavic period.

The beginning of the 1st century B.C. marked the rise of new cultures along the Black Sea coast and the lower reaches of the Dnipro, especially the birth

of Great Scythia. Cimmerian, Scythian, and Sarmatic nomadic cultures superseded one another over the course of millennia, leaving behind archaeological landmarks and genetic vestiges in the future pre-Slavic ethnicities.

In the early 1st century B.C., nomadic Iranian ethnicities, who engaged in livestock-breeding, formed distinct cultures which superseded one another: Cimmerians, Scythians, Sarmatians, Alazonians, Budins, Helons, and others. According to the Greek historian Herodotus, Great Scythia flourished during the 4th century B.C. The grandiose barrows of Scythian Tsars (Chortomlyk, Ohuz, Aleksandropolskyi, Kozel, and others) in Dnipro's lowlands are dated from this period.

In the 1st century A.D., the peoples of the Dnipro valley were driven out by the Sarmatian tribes into the forested areas of the upper reaches of the Dnipro and Desna Rivers. The Slavs assimilated with the local Baltic ethnos. Only in the 5th century A.D. did the original Kyiv culture, with a noticeable influence coming from the Baltic region, begin to form in the regions of mid- and upper-Dnipro and Desna Rivers. Jordan concluded that this group of Slavonic ethnos was previously referred to as the *Wends*. Historians divide the ethno-history of ancient Slavs into two epochs—the Wend and the Slavonic.

In the 3rd to 4th centuries A.D. the Chernyahiv culture, composed of various ethnic groups (Slavs, Sarmatians, Goths) took root in the area between the Dnipro and the lower reaches of the Danube. Goths played an important role in the establishment of the Chernyahiv culture.

The multi-ethnic Kyiv culture evolved in the second quarter of the first millennium. It was represented by the ancestors of the Slavic tribes that lived in the southern part of the mid- and upper-Dnipro basin and on the adjacent Belarusian territories. The historic relics of Kyiv culture are represented by three major territorial groups: mid-Dnipro, upper-Dnipro, and Desna.

The earliest written sources (Greek and Roman) about Slavs date from the first centuries A.D. The term 'Slav' emerges for the first time in the 6th century A.D. in the works of a 6th century Gothic historian, Jordan. Philologists have determined that the Slavonic languages belong to an ancient group of languages and that the ancestors of the Slavs had emerged in the northern zone of Indo-European settlements. Historians have divided the prehistoric period of the Slavic peoples into the following four stages: lingual

ancestors of Slavs (Neolithic and Eneolithic Periods); Proto-Slavs (3rd to the beginning of 2nd centuries B.C.); Pre-Slavs (Bronze Age, second half of 2nd century B.C.); and Pre-Slavs who were influenced by the Thracians, Illirians, Germans, Scythians, and others (end of 2nd to the beginning of 1st centuries B.C.). The Bulgarian philologist V. Heorhiev identifies three stages, namely: Balto-Slavonic (3rd century B.C.); transitional (3rd and 2nd centuries B.C.); and the age of separation of Slavs (mid-2nd century B.C.). Philologists presume the Germano-Balto-Slavonic community to have preceded the Balto-Slavs. The Dnipro and its tributaries are believed to have played a significant role in this process in terms of communication and transportation.

The victory over the Goths gave impetus to the development of distinct forms of early Slavonic culture which were imbued with elements of statehood. These new ethnic centres were located across the entire Dnipro basin (Polochany in the Smolensk area, Drevlyany, Polyany, and Siveryany around Kyiv).

In the course of the 14th and 15th centuries, the community of free Cossacks in the lower part of the Dnipro gradually acquired features of a distinct ethnoscenic formation. Its democratic political system had preserved the traditions of Kyivan Rus—"...a perfect combination of democratic settlements (kosh) and monarchic (hetman) principles." The powerful impact of the Zaporizhzhian Cossacks was significant in restoring the Kyivan Rus statehood which had been destroyed by the Tatar -Mongol invasion. The Kyivan Rus state was resurrected like the mythical phoenix to become a Ukrainian state. Long before the appearance of democratic constitutions in Europe and the USA, the life of Zaporizhzhian Cossacks was governed by the democratic constitution issued by Hetman Pylyp Orlyk.

Let us take a look at the results of some place-name comparisons. An amazing connection between times and peoples is detected in the names of rivers, towns, and lakes. It is the ethnographical flow of the Dnipro and its tributaries that gave names to many rivers and cities outside modern Ukraine. For example, the Dnipro's tributary Samara spawned other similar names in Russia—a Volga tributary is called Samara; there is a city Samara on the Volga; Samara is the name of a tributary of the Ural River; the town Sammara stands on the Euphrates (Iraq); there is the city of Samarkand in Uzbekistan; Sarkand was the name of the water artery in the ancient Seven Rivers area in

Asia (Kazakhstan); there is the Sarasphati river in India; and an ancient province Samaria exists in Palestine. We cannot but mention the Good Samaritan from the Bible.

One of the Dnipro's tributaries, the Bazavluk River, is associated with many names: Buzuluk is a tributary of the Khoper River which empties into the Don River. The same name is attributed to a Urals' tributary; there is a town of Buzuluk in Orenburg Oblast. The Dnipro tributary Trubizh has a namesake that empties into Plescheevo Lake in the vicinity of Pereyaslav-Zalesski. The urban-type of settlement, Schatzk, in the Volyn Oblast, is encircled by the Schatsk lakes. Its namesake in Russia is the town of Schatsk. Especially amazing is the Eurasian list of names which take their origin from the river Samara in the centre of the Indo-European arc in the Dnipro basin. This calls for serious ethnoscenic geographical research, the foundations of which were laid by the Russian scholar Lev N. Gumilyov. He places a significant emphasis on natural forces and their capacity to shape vital powers and the spiritual energy of various ethnos entities. He stresses: "We have reasons to consider ethnos as a system, composed of specific social and environmental constituents." The historian's task is "to be of use to 'The Fair Lady of History' and her 'Wise Sister Geography' which connect humanity with their Ancient Mother—the Biosphere of the planet Earth." His historical, geographical, and environmental research was geared towards understanding the interdependence between "the laws of nature and movement of social substance" that may reveal "the points of contact between Nature and Society." He asserts that Ethnos, being a natural phenomenon, is a reconnecting point in which humankind belongs to the social medium and Ethnos concurrently. Ethnogenesis is the mechanism of a dynamic fluctuation of the ethnic field, as it moves through phases of ethnoscenic balance to ensure harmony between humans and the environment. The concept of Ethnos was introduced to represent the fusion between the long-lasting formation of individuals and natural phenomenon.

The name *'Dnipro'* deserves special attention. The ancient Greeks, called the Dnipro *Borysphen* or *Borysthen* (one may sometimes even see *Borusthen*), which means "one that flows from the north." The earliest reference to the *'Dnipro'* occurs in the written sources of the 4th century A.D. The Don, Siversky Donets, Dnipro, Desna, Dvina, Dnister, and Danube Rivers have an interesting hydronemic relation. Historians suggest that there may exist a

hidden historical property between them, related perhaps to the ancient Indo-European hydronemy.

The German historian and philologist H. Schramm conducted research into ancient Pontic hydronemy and reached an interesting conclusion. Apparently, during the pre-Scythian period, the Dnipro had three names simultaneously: *Varos* (Borysphen in Greek translation) in the steppe zone; *Danopros* in the forest-steppe zone; and *Slavuta* in the forest zone north of the Kyiv heights. Schramm suggests that the first name derives from Iranian, meaning "the Wide", the second from Thracian (from Donawipzos), and the third from the ethnic name of Slavic people. It may, indeed, be that these are only hypotheses. On the other hand, all of our history is to some extent a collection of reliable hypotheses.

What conclusions can one reach following a thorough examination of this rather general chronological sequence? The number of ethnic centres and the scope of ethnic diversity in the Dnipro basin are truly astounding. There are few rivers on the face of the earth with such an abundance of ancient culture, centres, and civilisations. This may well explain the rise of the Kyiv State on the Eurasian continent in the last quarter of the first century and at the beginning of the second century. 25 Shortly afterwards, Kyiv became an important trade centre and a link between the Byzantine, Asian, and Arab countries and Western Europe. An American historian, Francis Dvornyk, once said "The Rus peoples mastered these skills and reached an extraordinarily high level of civilization." He continued: "The residents of Kyiv established their own political system—a wonderful combination of democratic towns and monarchic principles." It is assumed that ethnic diversity in the centre of civilisations in the Dnipro basin was historically determined by the cultural, informational, and genetic legacy of thousands of years of ethnogenesis. All this played a decisive role in attaining such a high level of cultural development.

It was not by chance that the historic community of independent Zaporizhzhian Cossacks (literally, free men from below the rapids) began to settle and grow in the area below the Dnipro rapids. Their genetic roots may be traced down to the ancient Indo-European, Scythian, and ancient Slavonic periods. In 1900, the Ukrainian historian Dmytro Yavornytsky wrote in his *History of Zaporizhzhian Cossacks:* "Obviously, the community of Cossacks, living in the lower reaches of Dnipro, was not formed immediately, but rather incrementally.

It grew steadily, accepting numbers of all kind of people, who were not happy about government regulations and were searching for freedom...." [86]

The general ethnic and ecological history of the great Slavic rivers hasn't been written yet. Incidentally, the same holds true for other great rivers of the planet earth that gave rise to civilisations and witnessed their rise and fall (the Nile in Egypt, the territory between the Tigris and Euphrates in Iraq, the Indus and Ganges Rivers, the Seven Rivers area in Central Asia, the Yangtze and Huang Ho Rivers in China). The writing of such a history is both our task and the task of our descendants.

The methodology of systemic research developed by Gumilyov is based on the theoretical assumption of the energy of 'living substance' of noosphere genesis, introduced by Vernadsky, and Bertalanffi's general theory of systems.[21] Gumilyov's research indicates that Ethnos is a form of energy and ethnogenesis is a natural phenomenon which left long-lasting traces of the presence of vital powers in the ethno-scenic environment. Gumilyov's systemic research, coupled with the ecological (biosphere) methodology of Vernadsky and the systemic approach of L. Bertalanffi, were supported by extensive historical, geographical, and ethnographical data. From the author's point of view, these elements constitute a universal symbiotic theory of the harmonious development of human society and nature.

In 2002, scholars from the Ukrainian National Academy of Sciences prepared and published a fundamental work, *Ethnic History of Ancient Ukraine.* The group of authors worked under the guidance of academician P. Tolochko. The chronological framework of this research 74 scales historic rises and falls of civilisations not only on the territory of modern Ukraine, but also of Russia, Belarus, and other countries. This publication contains original interpretations of written and archaeological findings pertaining to the early stages of Indo-European cultures and civilisations on the territory of Ukraine (the Trypillia, Seredniostohiv, and Chornolissya cultures, written documents of ancient Sumerian culture from the Stone Grave on the Molochna River).

In our view, the comparative systemic analyses of historic, geological, and climatic epochs in Eurasia (the Alps and the Carpathians, the Dnipro, Volga, and Ural Rivers) would significantly contribute to the development of an historically sound environmental concept of harmony between humanity and its environment. Such a methodology may be applied to stand-alone

natural entities, namely, to the Dnipro basin. This approach would enable us to understand better the ecological and ethnical sources of spiritual wealth and historical justice, and define the place and role of the Dnipro's spiritual powers in the history of the spiritual and cultural origins of Ukraine, Russia, and Belarus.

The quality of life is genuine not in the build-up of material welfare, but in the enlightened creativity of life, in the harmonisation of life.

Nikolai K. Rerikh

IV. IN SEARCH OF HARMONY OF VITAL FORCES

The vital forces of humans, ethnos, and society consist of physical, spiritual, natural, intellectual, and technological forces. Harmony and balance of vital forces ensures stability within society, completeness of life, and historical, physiological, and social longevity. Should one of these constituents become exhausted, especially the spiritual or natural one, disharmony, degeneration, or even complete extinction of ethnos, society, or Homo sapiens itself may occur. Many outstanding philosophers of antiquity and the present time have sought to achieve harmony of human vital forces.

In the historical past, the relationship between humans and nature was determined to a great extent by the rhythm of processes. The concept of general recurrence of natural and social phenomena, as well as the cyclic evolution of ethnicities, communities, and peoples has been recognised since ancient times. Enlightened people—priests, high priests, and the wise realised it. Oswald Spengler, Arnold Toynbee, Gumilyov, and other famous thinkers recognised the correlation of nature and social phenomena. The vital forces of humanity, ethnos, and community are also cyclic in nature—they die away, only to transform and grow stronger in their new upsurge.

In ancient Greek philosophical schools, such as those of Plato and Pythagoras, youth were primarily taught how to attain harmony between body and soul, how to observe nature, and how to understand its secret forces and rhythm. This philosophy is still practised in Buddhist schools and monasteries today, that is, not as the conquest of nature but the true perception of nature in order to achieve harmonious co-existence.

Christianity has taught us that the implementation of the divine ideal includes the ethics of responsibility. Humans are truly religious and spiritual beings only when they resist the desire to harm living creatures or nature and when they submit to an inner incentive to create good and to love life. Christian ethics, as Albert Schweitzer argued, starts with this "reverence towards life."

Thales from Milet (about 625 or 640 - 547 or 545 B.C.), an ancient Greek philosopher, forefather of ancient philosophy, and founder of the Milet school, one of the first philosophical schools, associated all variety of matters with one initial element—water. He considered water a primal matter. Water, he taught, is the source and origin of everything. At the same time, water and everything that descended from it is not inanimate but alive. According to Thales, nature, both live and inanimate, has an initial driving force, namely the soul and god.

Lao Tzi (Li Er) (born in 604 B.C.), the great Chinese thinker and a founder of Taoism had similar teachings. The main notion of Taoism is Tao, which is metaphorically linked to water (susceptibility and resilience). Lao Tzi said: "The higher good is similar to water. Water enlivens all living creatures and never contests with them. Everything that doesn't comply with Tao (presumably, harmony) dies prematurely." Taoism is the philosophy or the path towards harmony. While one might not achieve absolute harmony, the path towards it will be righteous and a true path of development. According to Lao Tzi, people should not interfere with nature's way of development.

Pythagoras of Samos (circa 570-500 B.C.), the ancient Greek philosopher, also embraced similar teachings. Pythagoreans referred to the world as cosmos, implying its harmony and perfection (the Greek word *cosme* means "beauty"). Perfection of the cosmos is based on certain numerical correlations which are the basis of the motion of heavenly bodies. They are also the basis of musical harmony and may even be found in the proportions of the human body. Pythagoras was the first to call the discourse on animate life *philosophy* or love of wisdom.

Heraclites of Ephes (about 544-438 B.C.), another ancient Greek philosopher, extended some of these ideas. He developed the concept of perpetual flux and formation and taught us that "everything is in a state of flux," and "one can not step into the same river twice". According to Heraclites, humanity is part of nature. Nature (cosmos) is a perpetually living, pulsating flame (energy?) which was not created by anyone. It is eternal and immortal ('divine'). We should conform to nature and its "animate" soul—everlasting fire-Logos.

It is interesting how Heraclites sees "the barbarity of the human soul" in its specific corporeal state. He explains that although the soul originates from moisture, it tends to dry up. The difference between a 'wet' and a 'dry' soul determines the difference between a fool and a clever person. The soul of a wise man is the driest and the best. According to Heraclites, in the state of utmost dryness a soul radiates light.

Socrates (about 469-399 B.C.), another ancient Greek philosopher, was one of the founders of dialectics as a method of the search for truth. He regarded self-realisation as a way to achieve harmony, which was the aim of philosophy.

Democritus (circa 470-360 B.C.), the ancient Greek philosopher, considered the achievement of the highest level of well-being, or harmony, possible by limiting one's desires and by adopting a moderate lifestyle.

Aristotle (384-322 B.C.), the ancient Greek philosopher and universal thinker, conceived of the essentials of many new sciences, namely physics, biology, psychology, logic, and ethics. He considered god the highest instance of natural rather than social order. The roots of European civilisation extend back to ancient Greece, where a continuous, unified culture flourished. The ancient Greeks had a distinctly integral and clear vision of the world, as did Oriental philosophies in general, including Hinduism and Buddhism.

The scientific revolution is usually associated with the names of Copernicus, Galileo, and Newton. The scientific method was developed and we owe our present-day scientific and technical progress to it. Yet it destroyed the wholeness and integrity of the world. We alienated ourselves from nature. Disharmony prevailed in the development of civilisation. We are now facing its consequences and again trying to find a way back to harmony, but we tend to forget that humanity has already passed this way. Moreover, these paths were traversed differently in various countries of the world. There were always

countries that were able to maintain the traditions of harmonious coexistence with nature, dynamic equilibrium between spiritual and material forces and between peoples and society for millennia.

Capitalist and communist ways of development, based on dominating materialistic philosophy, have proved to be destructive and a dead-end for humanity and the environment. A famous American economist-iconoclast and ecologist, Hazel Henderson, came to the conclusion that "a global obsession with growth resulted in a remarkable similarity between the capitalist and communist economic systems. A fruitless dispute between capitalism and communism is irrelevant, since both systems are based on materialism...both of them pursue the objectives of industrial growth and the use of technologies with strengthening centralism and bureaucratic control." (cited in 35) She is confident that the main aspect of cultural transformation is that from the Oil Age and industrial era to the new Solar Age. Similarly, Tommazo Campanella comes to mind with his fantastical "city of the Sun", a city of higher harmony which is ruled and guided by the Sun (a high priest), Wisdom, Power, Love, people with a zest for life, who develop their physical and spiritual forces and are free from the power of things. Henderson extends the notion of the Solar Age to her own vision of a future culture.

Material production based on the exploitation of nature and the interaction of society with nature for the overwhelming purpose of societal development to the detriment of nature have always formed the foundation for the vital functioning of society. In this global model of vital functioning, science has existed to 'serve' and 'justify' the aims, directions, methods, models and technologies of development, or, as one may argue, science has provided a pragmatic way towards the enrichment and benefit of humanity and society. As a result, all natural sciences became 'morally' subordinated to the theory of economic growth in the name of production and appropriation from nature. In this process, we accumulate surprisingly little, only 1.5-2% of all natural living substance, while the remainder are the by-products of our vital activities—waste, that is 'inanimate substance'. It is therefore possible to assert that the selected scientific foundation of this extensive societal development was the cause of the 'deadening' of nature and 'dis-ensoulment' of humankind. In addition, it led to a certain intellectual inertia due to the domination of technical education and development of the 'non-ecological' fields of science.

European logic often confuses culture with civilisation or an eternal entity with a temporal and transient one. The great sage, Nikolai K. Rerikh, differentiates between these notions. For him, culture is a broader, comprehensive, refined primordial concept. Culture should justify and animate civilisation as its constituent. Only through culture, but not through civilisation, may people develop harmoniously and reach harmony between themselves and nature.

Rerikh, had his own vision of future culture and preached it passionately and with inspiration. His vision was that "culture consists of two roots, the first one is Druidic – 'Cult' – and will always be a homage to the Good Beginning, and the [second] – 'Ure' – reminds us of an old oriental root that means Light, Fire." Thus, on the one hand, Cult-Ure may mean worshipping of light (or the sun). On the other hand, the notion of culture should not be abstract. According to Rerikh, "Culture is closely connected with spirituality. It is primarily expressed in the refined and multiform creation. Quality of life ought to be reflected in the enlightened creation of life, in the harmonisation of life instead of accumulation of material wealth." [67] Rerikh understood that culture should be cleansed through purification and the transformation of human consciousness. This is what he devoted his entire life to. He saw the path to harmonious life in this process. Rerikh was a scientist, a great traveller, an archaeologist, an historian, a philosopher, and an original artist who painted over 7,000 canvases, including portraits of Yaroslav the Wise, Saint Sophia, and other historical paintings. In addition, he was a public figure on a global scale and was a member of many academies around the world. The range of his interests and teachings seemed to personify the connections between the various Indo-European cultures, both oriental and occidental.

As mentioned in the previous chapters, Ukraine, and specifically the Dnipro basin, covering 80% of its territory, is rich in monuments of ancient cultures, such as the Indo-European, Pre-Cimmerian, ancient Greek, Scythian, Trypillia, Chernyahiv, Slavic, and others. V. Grytsenko wrote in the secondary school text-book *Man and Culture:* "Continuous close relations with eastern and western countries became an indispensable means of conceiving our own spiritual identity as well as tolerance towards foreign cultural manifestations, which is typical for people for whom spirituality is a determining force." [20]

In the Poltava Oblast, a monument of ancient Scythian (Scythian-Helenic?) culture was created in the area of Bilske Horodysche where, as historians as-

sume, the capital of Great Scythia, Helon, was located. Today, the Ukrainian government has immortalised Trypillia culture through the establishment of a corresponding centre in the Cherkasy Oblast. This initiative is the first step towards the revival of spiritual centres of societal harmonisation and should be incorporated into the International Programme of Harmonisation of Life of the Dnipro Basin Peoples. Spiritual-ecological centres should be established in the Dnipro estuary and turned into mass pilgrimage sites like those in Mecca and Kyiv Pechersk Lavra, to which people come from far away. As described in E. Marchuk's book *Ukraine: New Access Paradigm,* these spiritual-ecological centres ought to be established in every oblast in the form of eco-socio-cities, [47] at sites where there are collections of archaeological landmarks. At first, there will be a few of them, just one or two in each oblast, but they should become real centres of noospherogenesis in the Dnipro basin.

In the time of antiquity, the wandering priests from a variety of ancient lands paid regular visits to the Stone Grave on the Molochna River in order to replenish their spiritual powers. Just like modern people who look after the graves of their relatives and cleanse their souls with prayers, those wanderers used to protect and take good care of their forebears' burial places. In our view, they also ought to attend the burial places of their ancestors, regardless of whether these are the Scythian, Sarmatian, Gothic, ancient Greek, or Slavic graves. After all, they are our ancestors, too, buried along the entire length of the Dnipro. This memory, the love and respect for them must be eternally embedded in our restored traditions and rituals. Only then, gradually, step-by-step, will we restore the severed spiritual connection between times and generations. We will then be able to enrich the life-giving forces of the Dnipro, awake our ecological wisdom and rekindle the realisation of our need to live by the laws of nature and harmony and protect our common home—the great Dnipro River.

Contemporary generations ought to realise that the Dnipro basin is not just the water, soil, forests, landscapes, towns, villages, enterprises, and people who live and work there. It represents an enormous wealth of archaeological landmarks and burial grounds and is a storehouse of national spiritual powers. There are about 800 early Palaeolithic monuments, and 300 Mesolithic landmarks, including 88 tombs in the collective necropolis located above the Dnipro rapids. Within the boundaries of Ukraine there are about 600 Neo-

lithic burial places, most of which are located in the areas above the Dnipro rapids, the Sea of Azov, and the Siversky Donets River (Dnipro-Donetsk cultural entity). Landmarks left by the Trypillia, Seredniostohiv, Usativ, and Chornolissya cultures with Indo-European features are found on both sides of the Dnipro basin and along its tributaries. The Kyiv, Chernihiv, Pereyaslav, and Smolensk regions have retained the essence of the ancient peoples, registered in historical chronicles like Polyany, Severyany, Drevlyany, and Polochany. Each and every archaeological landmark represents an ancient nation that used to reside in the Dnipro basin. They must be preserved through the establishment of historical scenic reserves, following the pattern of the Belski and Trypillia ethno-cultural centres.

It is appropriate to mention here as examples the landscapes that have personified the Motherland for Ukrainians. As V. Krysachenko, a Ukrainian scientist, wrote, the Velyky Luh ("Large Meadow"), the steppe itself, and the Dyke Pole ("Wild Field") were the predominating landscapes for the Zaporizhzhian Cossacks. [41] The capitalisation of these words reflects people's respect towards these creations, which bring people outside and beyond the bounds of their trivial frame of existence.

Nikolai Gogol wrote a wonderful description of the steppe in his novel *Taras Bulba.* Nothing could be more perfect in nature, notes the writer: the entire surface of this untilled land looked like a green-golden ocean with millions of flowers splashed everywhere; only wild horses could trample down even a little bit of these riches. "Damn you, Steppes, how beautiful you are!" exclaims Gogol. As for a more austere or a more rationalistic description of the steppe, there is no better expert than Academician D. I. Yavornytsky.

The Zaporizhzhian steppe, despite local peculiarities, was an open space with natural hills, ravines, and valleys. Gullies and ravines, which usually represent other landscapes, were also found in the steppe, providing it not only with a distinctive ecological and geographical uniqueness, but also with significance in terms of military strategy, economy, and colonization. [86]

According to Yavornytsky, Dnipro water-meadows had a tremendous importance for the Cossacks, providing them with timber, hay, game birds, and animals: "These water-meadows were lowlands covered with grassy and woody vegetation, intersected by rivers flowing in different directions, bays, estuaries, channels, numerous major and minor lakes, overgrown with tall impassable

reeds." Velyky Luh is also a marsh-meadow, the biggest and the most famous, which stretches from the Island of Khortytsia left of the Dnipro down to the Mykytyn Rih. [86]

Today, the landscapes of the steppe, Dyke Pole and Dnipro marsh-meadows no longer exist. The land was ploughed and flooded and the wholeness of the eco-ethnic environment of the lower Dnipro was irreversibly damaged. Whatever is left should be protected and transformed into monuments of the landscape, the steppe, or the water-meadow culture, borrowing and building upon the experience of the Askania-Nova museum-reserve.

Towards the end of the 20th century, humanity embarked once again upon a path towards the harmony of vital forces, but only after it realised the profoundness of its folly and became concerned with the vital need to conserve the environment. [19] The year 1992 became a turning point in the formation of a 'new' ecological vision based upon the concept and strategy of sustainable development. However, despite the principles of balanced, sustainable development, proclaimed in 1992, the suffocating inertia of traditional economic thought still dominates.

The challenges and threats of the 20th century are new for humanity. These include 'nuclear winter', ozone holes, anthropogenic global warming, the Chernobyl accident, water, air and land pollution, desertification, demographic problems, fundamentalism, terrorism, and more. They have initiated the realisation of the need for a new world vision, new science, a new economy, new education, a new way of life and interaction with nature. This is how the concept and model of global sustainable development as 'a cure-all for all mischief' came about. However, the ten years coinciding with the decade following the Rio Earth Summit in 1992 have shown how 'unsustainable' the concept of sustainable development itself is. And it is still an open question whether we will gain much from this sustainable development or whether we will incur irreparable environmental losses. Nowadays, scientist-philosophers have began to realise that societal sustainability is not only impossible but also inconceivable—unless humanity begins to consider itself as part of a synergetic process and enters a mode of co-evolution or conjugation or harmony with the biosphere.

The primary condition for a sustainable development of any system is its operation according to the laws of the whole, in other words, the principle of

integrity, which is itself an attribute of the cosmic level functioning in each entity, be it an atom, an organism, or the universe. The integrity of action shows the necessary interrelationship of all forms and all levels of existence or the harmonious correlation of humans and nature and the harmonisation of human activity. At this level, it demonstrates our capability to feel a social spirit, to perceive social interests, and to realise our role in environment protection. This integrity of action is our ability to feel the situation emphatically and to support the primary law of life and nature—the principle of sustainable balance. It is a harmonious attitude with the vast entirety, in this case, with the society where we function as a personality, on the one hand, and on the other hand, as a biocoenotic species together with our 'lesser siblings', the dumb animals, who may be 'lesser' in intellect but not in terms of spirituality. At the level of society, it implies an increasing significance of ethics, morality, spirituality, and social and natural integrity, which struggles to overcome our egoism towards the rest of the biosphere. It also implies a capability of the society to fully harmonise its relationship with nature and to co-exist reasonably with it.

It is obvious today that we need to transform our philosophical world vision from anthropocentrism to cosmo-centrism, the nucleus of which will be the recognition of the cosmic meaning, spiritual substance, expressed in the form of a moral law and culture of behaviour. At the same time, keeping in mind our negative and unstable experience of vital functioning, we must recognise that moral law is not a human invention but an afflatus and a cosmic justice. Inherently, we should recognise the advantage of the eastern eco-humane world vision over the individualistic model of western civilisation with its philosophy of anthropocentrism, egoism, and unrestrained enrichment.

Western, or better yet, American-European, civilisation, still prefers a technologised world vision. This notion was most vividly expressed in one of the reports of the Club of Rome, by E. Weizsekker, Armory B. Lovins, and L. Hunter Lovins, *Factor Four: Doubling Wealth, Halving Resource Use.* [15] In this book, the authors attempt to reconcile the aspiration for a high standard of living with the need for the diligent use of natural resources. The main idea of their work is the justification of the concept of "resources productivity", which, as the authors understand it, is the possibility to live twice as well using half as much of the resources necessary to achieve sustainable development. The authors provide specific recipes for success, systematised according to the

resources type and based on the use of the existing experience of "resources productivity" improvements in different countries. The *Factor Four* effect is the systemic integration of minor innovations (technical, technological, economic, managerial) in any area of application, be it a home, an office, equipment, a parcel of land, etc.

Since the time of the industrial revolution, the meaning of progress has incorporated an increase in labour productivity. *Factor Four* offered a 'new' approach to progress based on the improvement of resource productivity. Indeed, due to the refocusing of production and the reorientation of vital functions to *Factor Four*—saving, efficient use of resources and energy, more extensive waste recycling and refining, responsibility towards customers—for the first time the economic cycle has been 'completed'. In planning our social and economic development, we already take into consideration the effects of disturbance of the natural cycle of matter or introduction of unnatural compounds into it ('chemicalisation'). For many developing countries, only a revolution in efficiency will enable them to achieve a higher standard of living. The authors of the new report to the Club of Rome (a group of chosen politicians, scientists), besides predicting further increase in consumption in the developed countries, also foresee this objective for the rest of the world. The authors themselves realise and warn that an insatiable consumption devoid of any ethic and spiritual norms may outrun the 'efficiency revolution'.

The authors of 'neo-generosity' do not introduce anything fundamentally new into their strategies, plans, and programmes of sustainable development. Moreover, 'neo-generosity' only leads them along the usual way, creating an illusion of the possibility of resolving ecological problems, which are underestimated. Besides, the authors address the problem of biodiversity in a very superficial manner, and avoid any mention of the problem of destruction of natural ecosystems.

Technological approaches should not be denied in principle, but they should be considered a condition of transition to sustainable development, and as one of the mechanisms for harmonisation of human existence.

Among Ukrainian scientists, there are also adherents to a 'technological approach' and 'technological breakthroughs'. Thus, in the article "Technological Forecasting as an Instrument for Strategic Decision-Making" by M. Zgurovsky, Academician of the National Academy of Sciences of Ukraine, ecological

aspects are not considered at all in the strategic decision-making process of the general societal development model. He presents only new technologies, business, science, and education as the key factors. It is clear that the author would like to bring Ukraine's production and economy to world and European standards as fast as possible by means of technological breakthroughs. However, according to those world and European standards, any technological innovations must be ecologically justified. Otherwise, further resource imbalance and life disharmony are inevitable.

An alternative biotic mechanism for regulating sustainable development, based on the limits of economic capacity of the biosphere, is presented in *Ecological Challenge and Sustainable Development* by V. I. Danilov-Danilyan and K. S. Losev. [23] The authors focus their attention on the co-existence of nature and society—co-evolution—as their "idea of salvation" and consider technological aspects in terms of scientific and technical support of sustainable development or noospherogenesis. Technology cannot substitute biota in regulating the environment. That is why our main task is to stop the destruction of biota and allow it to regain its self-regulating potential, i.e., to subside "technologically" and free as much space for the biota as it requires. This is feasible if the biotic regulating mechanism becomes the determining force on the path towards sustainable society, based on "new ecological thinking" and legally accepted norms of economic capacity of natural entities (river basins, landscapes, etc.).

The economic capacity of the Dnipro has long ago exceeded all reasonable limits of growth. How can one consider, then, sustainable development of the Dnipro basin as a life supporting natural entity? The only way one may look at it is from the perspective of harmonisation of vital activities in the basin, modelling and implementing a basin system of socio-natural centres of noospherogenesis.

In the book *Noospherogenesis and Harmonious Development,* 80 Ukrainian scientists V. Ya. Shevchuk, G. A. Bilyavsky, Yu. N. Satalkin, and V. M. Navrotsky integrated modern theoretical, methodological, and philosophical approaches to noospherogenesis and sustainable development. The authors concluded that there is a need for a symbiotic theory and methodology of harmonious development, and harmonisation from within the bounds of a habitat.

Harmonious development, unlike sustainable development, is considered as a strictly balanced development, in which nature predominates over our activities and is not a resource for economic growth. This is a multi-factor process consisting of structuring society according to the laws of nature; achieving a harmonious sustainability of society, with cultural and spiritual development as priorities; and applying the technological and biotic regulating mechanisms of the life harmonisation process in a balanced manner.

The authors presume that in the definition 'sustainable development' itself there is a methodological contradiction, since according to the *"Law of System Development Using Environmental Resources,"* development can occur only with the use of natural resources. [65] There is, however, another document on nature, the *"Law of Exhaustibility of Natural Resources,"* [65] which stipulates that all the natural resources (including natural conditions) of the earth are exhausted. This exhaustion occurs either due to the direct exhaustibility (oil, gas) or due to the perturbation of the environment, which becomes unusable for the existing economy and human life, as, for instance, the flooded areas in the Dnipro basin due to the creation of artificial water reservoirs.

That is why, according to the authors, harmonious development with nature as the dominant force better conforms to the aims of socio-ecological and economical balance in accordance with the laws of nature and universal harmony. Inherently, the theory of noospherogenesis acquires a systematising significance in the modern interpretation of the problem of achieving societal sustainability rather than sustainable development. There is no other means for further development: there is a critical gap between humanity and nature and it is necessary to harmonise the remaining potential of our spiritual, physical, intellectual, technological, and natural forces before they are completely exhausted. There are hardly enough vital forces, even for the development of the illusory 'new (Internet or virtual) economy', 'post-industrial', or 'information' society. Would it not be better to return a 'natural society' with a natural environment to our grandchildren?

Harmonious development is indeed a multi-factor process, the rates and quality of which are predetermined by different combinations of social, cultural, economic, military, technological, environmental, ethic, and other factors of instability. Which of these factors has a greater or lesser impact? How can a system of priorities be created, based primarily on the scale of impact? How

can we plan a multi-factor process with various groupings of indicators of life harmonisation and quality? These and many other questions transgress the bounds of any single system, be it theoretical or technological, social or ecological. They refer to the theory of vast systems of development, i.e., "a system of systems," which is well described in the fundamental work by the distinguished environmental scientist N. F. Reimers. [65]

In our opinion, the theoretical principles of harmonious development themselves should be presented as a "system of systems", i.e., "a large theoretical-methodological system", in which the theory of noospherogenesis and biotic regulation of the environment can play a leading role at the strategic phase of the life harmonisation process. However, the position of each theoretical element of the system (dynamic balance, biosphere evolution, development process, etc.) of theoretical-methodological principles of harmonisation must be defined. That is, an integrated theory of harmonisation of life, a fundamental theory of harmonisation of development, should encompass the interests of all the theories and methodologies (theory and methodology symbiosis) associated with the process of harmonisation.

The development of a symbiotic theory of harmonisation of life should not be a prerogative of only one group of scientists—it should be developed on a competitive basis. Systemic analysts from various branches of science should play a leading role in this process, including people with an environmental outlook, who have a global understanding of the problem of harmonious development and the ecological paradigm, albeit with actions of a national character.

Today, Ukraine has a great enough scientific potential to form a task force for the development of a symbiotic theory of harmonisation of life and its theoretical-methodological principles. Ukrainian scientists are capable of developing theoretical-methodological proposals for harmonious development with a philosophy of noospherogenesis in a competitive process across Ukraine. In order to identify qualitative and quantitative characteristics (indicators) of a complex multi-level and multi-functional harmonisation process, it should be modelled first.

Only by means of multi-factor national and regional modelling is it possible to identify alternative maximum permissible levels of economic capacity of certain natural entities, ecosystems, and regions of the biosphere and

optimal technogenic load during certain periods of time. Only by relying on the scientific theoretical definition of the initial state of natural, economic, technological, social, and other systems is it possible to apply the theoretical principles of biotic regulation of the environment or the management system of the life harmonisation process with biotic priorities rather than 'technological' ones. Thus, certain fundamental initial regulations should be established for strategic planning of the life harmonisation process, oriented towards the final result, specifically, a harmonious sustainable society with maximum permissible norms of economic capacity of the biosphere and natural ecosystems.

With this approach (which is known as a system or system-process approach) each local theory (i.e. theoretical principles of addressing local issues within a larger process) finds its place in the symbiotic theory of harmonious development on the philosophical basis of noospherogenesis or the fundamental theory of societal harmonisation.

All theoretical-methodological works should be systematised, beginning with the legacy of the internationally recognized Ukrainian noosphere theorist Vernadsky; Reimers's ecological theories, laws, and rules; the theories of the solar nature of added value of Podolynsky and M. Rudenko; and modern theoretical-methodological works on historical, cultural, geographical, natural, social, economic, technological, and other aspects of the symbiotic theory of the harmonisation of life.

In selecting theoretical-methodological principles of harmonious development negative lessons of global development using market mechanisms of unlimited consumption of natural resources should be taken into account. Market reform may not in itself be the goal of societal development. Developed countries have come to understand the devastating character of an 'unregulated market' through trial and error. It is globally recognised that only development that is socially compatible, is oriented towards conservation of resources, and contains regulating mechanisms is safe. Many market theories of development faced a fiasco and went bankrupt.

One of the most urgent tasks today is the formation of a noospheric, environmental outlook among statesman, politicians, and social activists, as well as the business community, of Ukraine.

On a system-wide scale, any system requires the following elements for its harmonious development:

- Efficient and reasonable (noospheric) organisation in terms of time and space;
- Provision of balance and dynamic equilibrium of its constituents;
- Clear objectives of the harmonisation processes (biotic, cultural, economic, social, technological, etc.);
- Availability (presence) of initiating forces (biotic, cultural, economic, social, technological, etc.)

Each of these system constituents should have its basic model, formed on the basis of a unified methodological-systemic approach to societal and life harmonisation. At the same time, one shouldn't forget that a sustainable society is one in which there is a harmony between life values and a continuously changing reality.

Another global 'synthetic' approach is described by Alice Bailey in her book *Education in the New Age.* [8] She concludes:

> Our main hope of survival in this highly polarised world lies in the prodigious effort to synthesise the two cultures while there is still time. Should the East deny us that time and decide to meet us merely on our own grounds, then this might be the end of time for us all, East and West.

> During our industrial and expansionist age there is increasing evidences of the great power of Eastern thought which permeates the fields of science, philosophy and the arts of the West. Psychosomatic medicine, parapsychology, Jung's analytical psychology are only a few indications of contemporary research oriented at our inner world. The appearance of the spiritual factor in life and science is somewhat more than the recrudescence of earlier forms of Christian ideology.

This idea was supported by a document prepared by the Department of Cultural Affairs of UNESCO, called: "The Concept of Man and the Philosophy of Education in East and West." It states:

> UNESCO can not remain impartial to this problem (of East and West). It is bound to address the problem face to face in current global conditions, stipulated by the increasingly rapid process of unification, the reduction in distances, the growing importance of technology, the gradual attainment of political independence by all peoples, the feeling of international responsibility and, above all, the uneasiness and perplexity tormenting the two great civilisations of yesterday, ready to conceive one civilisation of the tomorrow, but wilting from the threat of a global crisis which is far beyond their control.

It continues further about the role of science:

> Researchers acquainted with the data of scientific research ought to gather our knowledge about nature and synthesise a body of integrated principles, in order to establish a Pythagorean-Platonic-Bruno cosmogony, a picture of the world similar to the pantheism of Eastern thought, wherein man could respect nature because nature is worthy of awe and reverence. Humanism, which became excessively anthropocentric is too stagnant and is in need of a world philosophy in which the infinite and eternal cosmos would serve as another pivot point around which the new synthesis (symbiosis—*auth. note*) could grow and spread.

The spiritual and moral principles of humankind's coexistence with nature have gained a new meaning for humanity today in terms of cognition and perception of life. Beyond the realm of these principles lies ecological collapse. Any social, scientific, or technical innovations should be morally and ecologically pure. Let us remember that sooner or later we will have to pay for all the misdeeds that we have committed. For the damage afflicted upon nature, we will have to pay the price of life itself, if not our own, then those of our children or grandchildren. We do not need a more vivid example than Chernobyl.

The Dnipro basin, the territory of modern Ukraine, was historically the place of symbiosis of western and eastern cultures. Indo-Europeanism, most pronounced in Rerikh's teachings and philosophy of World Culture, arose in the Dnipro basin back in the geological era. Here, the cultures of Ancient Greece and Great Scythia (Byelske Horodysche, Olvia) crossed. It is therefore reasonable to pose a question: Doesn't Ukraine have a special role in uniting East and West, in bringing together scientists, politicians, and priests, who stand divided today in their ambitious confrontation?

Only a Great National Idea of Future Harmony may reconcile and unite Ukrainian (and not only Ukrainian) clerical, political, and scientific elites. A world spiritual-ecological cultural coalition can become such an idea. 'Think globally, act locally!' The idea of a spiritual-ecological coalition is closer to the Ukrainian people than to any other nation in the world. Its implementation will not require great spiritual power. Historically, the peoples of Ukraine have been disposed toward the perception of an east-west life philosophy. Orthodoxy has never been an aggressive religion. Moreover, it is a religion of martyrdom, a religion of social and human patience. Patience, which is in such short supply, is one of the virtues of wisdom. Patience is that fertile ground on which the philosophy of harmonious continuity of human life and environment may grow. This is a case when a 'shortcoming' (as apologists of aggressive western civilisation think) of the Ukrainian nation can become an advantage! The peoples of the Dnipro basin, the political, scientific, and religious elites of Ukraine, Russia, and Belarus still have time to choose the right way of life—a path to harmonise vital forces on the philosophic-theoretical basis of noospherogenesis and the traditional spiritual values of life.

It is some kind of a powerful, great, natural force, and, at the same time, it is a wonderful, fascinating, overwhelming and attracting force. No matter, what stage of development a person is at, he cannot help being delighted with what he sees in front of himself, he cannot help stopping and say to himself: what could be more beautiful in this land?

D. I. Yavornytsky

V. IS THE ECOLOGICAL REHABILITATION OF THE DNIPRO FEASIBLE?

Seven years of experience of Ukrainian-Canadian co-operation on the ecological rehabilitation of the Dnipro basin have assisted in the search for the answer to the question, Is the ecological rehabilitation of the Dnipro feasible? 30 The answer is a decisive 'yes', but only if the issue of the rehabilitation of the Dnipro's vital forces and the concern for the future of coming generations will permeate the hearts of the nations inhabiting the Dnipro's sacred lands. These concerns must find their way into the hearts of national and state elites, city and town mayors, and managers of enterprises located in the riparian zones that discharge untreated or poorly treated wastes into the Dnipro waters. Today, major problems in legislation and the administration of enterprises—resting with various levels of government and business, from the director of a small-scale enterprise to the Prime Minister of Ukraine—still exist.

The commencement of Ukrainian-Canadian co-operation in 1994 co-incided with the beginning of the development and evaluation of a systemic approach methodology to the problems of the Dnipro basin under conditions of socio-economic reforms.

At the initial stage of the Co-operation Programme, over 40 projects were implemented jointly. Extensive work was done in areas of personnel training, the establishment of information systems for environmental management, the development of environmental policy, the education of the population, fundamental research on water quality, environmental audits, 'green technologies', and municipal management of water pollution. The work accomplished facilitated the development and approval of the National Program for the Environmental Rehabilitation of the Dnipro Basin and Improvements in Drinking Water Quality.

The goal of the second phase of the Programme was to facilitate an organisational reform process aimed at Ukrainian environmental organisations, to improve economic and investment policy, and to enhance environmental awareness of the population of Ukraine.

A significant role in the selection, implementation, and approval of the projects at both the first (1994-1997) and the second (1998-2000) stages of the Ukrainian-Canadian programme was played by the Ukrainian-Canadian Co-operation Programme Management Committee. Ukrainian membership in this Committee changed at different stages of the co-operation, yet it always included the most involved and active authorities from Ministries and Departments, representatives from scientific institutions of the National Academy of Sciences of Ukraine, institutes, and NGOs involved in environmental management.

The philosophy of the first stage of the Ukrainian-Canadian Co-operation Programme can be summarised as an effort to increase the efficiency of state environmental management of the Dnipro basin ecosystem and water quality, in particular:

- To determine and implement measures to reduce water pollution in the Dnipro and its tributaries and provide the population with clean drinking water, particularly in the Zaporizhzhia region;
- To facilitate further co-operation between communities in Ukraine and Canada and to involve NGOs in resolution of environmental problems of the Dnipro basin;

- To activate the process of information exchange between scientists, scientific research institutes under various Ministerial Departments, officials responsible for aquatic ecosystems, and comparable parties in other countries, particularly Canada.

The second phase of the Programme aimed to establish favourable preconditions for investment within the framework of environmental co-operation. The Programme focused on the following three areas:

- development of systemic basin management under conditions of the integration of environmental policy into the strategy of economic reforms;
- evaluation of the effectiveness of measures to reduce pollution of surface and ground waters based on demonstration projects;
- development of mechanisms for ecological investment activities oriented towards the market economy.

During the seven-year period of the programme's implementation, 70 projects were selected on a tender basis for implementation out of over 300 proposals. Special reports were presented on each of the projects at the plenary sessions and meetings of the final conferences in 1997 and 2000. All projects achieved their established objectives. Their results provide support for the implementation of the National Program for the Environmental Rehabilitation of the Dnipro Basin and Improvements in Drinking Water Quality.

The following pilot projects should be mentioned since, according to expert evaluation, they produced significant results.

First stage of the Programme (1994-1997)

An extensive international expedition along the Dnipro in 1994, which successfully combined the efforts of Ukrainian scientific schools (scientific research institutes, the National Academy of Sciences, and various government departments), Canada, the Netherlands, and Slovakia was carried out for the first time. Its results contributed to the drafting of the National Program for

the Environmental Rehabilitation of the Dnipro Basin and Improvements in Drinking Water Quality. They also served as a source in the development of a methodology for the unified environmental classification of the quality of surface waters and estuaries in Ukraine and the mapping of water bodies of the Dnipro basin, as well as the basis for the establishment of environmental norms of surface water quality.

The concept of environmental audits was implemented in Ukraine at the methodological, practical, and legislative levels. A Canadian company, AGRA, together with specialists from the Dnipro Renaissance Foundation (now called the International Dnipro Foundation) and representatives of scientific research institutes and producers associations, conducted environmental audits of food industry enterprises and developed recommendations regarding cost-effective production modernisation and implementation of state-of-the-art industrial waste purification technologies. A unique anaerobic waste purification module was purchased from the Netherlands using part of the project funds. It was installed at the Yahotyn sugar refinery where a training centre was later established. A manual on environmental management and environmental audits was developed and a series of scientific and hands-on workshops were held, both in Canada and Ukraine, on the topic of environmental audits.

A few words are in order regarding the monitoring of drinking water quality and industrial wastewater indicators of Zaporizhzhia enterprises. The initial assumption that a significant volume of water is wasted on the way from the source to the end user proved to be true. This result established the grounds for a thorough examination of this issue and the development of new methods of city water supply network repairs and accurate identification of locations where pipes were leaking, without the need to dig channels. A Canadian company from Edmonton provided approximately 1,400 water metres to the residents of Zaporizhzhia free of charge.

Based on the results of monitoring Dnipro reservoir buffer zones, comprehensive recommendations on the enhancement of the environmental state of buffer zones were developed and implemented at one of the sites. A three-km-long buffer zone was created, the first of its kind, on the Kaniv Reservoir, which prevented river banks from collapsing at the nearby settlements and provided recreational centres and a highway, demonstrating the possibilities of coastal zone rehabilitation.

Recently, the development of an information system for environmental management of the Dnipro has been initiated. A number of information technology projects were applied, the most important of which was the project dealing with the establishment of a regional environmental management system for the southern part of the Dnipro basin at the Ecocenter in Zaporizhzhia. At the State Hydro-Meteorological Committee within the Ministry of Environmental Safety (now the Ministry of Environment and Natural Resources), computer centres for processing data on the state of surface water were established. Computerised work stations function in 20 oblasts of the Dnipro basin.

Phase II: Co-operation Programme (1998-2000)

An important accomplishment of this phase is the development of a modular technology processing unit (block-module type technology) as well as technology for the final clarification of drinking water. Cost-effective, small-size processing units are capable of purifying water and removing heavy metals, petroleum products, toxic organic compounds, radio-nuclides, viruses, and micro-organisms, producing high quality drinking water that meets European and world standards. The small-size units have been installed for trial at schools, kindergartens, and hospitals.

A digital data base using state of the art GIS technologies has been established to monitor the ecological-geological state of ground water, chemical soil contamination, the development of hazardous geological processes affecting ground water utilisation, and drinking water supply in the Dnipro basin. Recommendations were made regarding key provisions of the Law on Drinking Water of Ukraine, utilising the experience of other countries. A mechanism was developed for the implementation of key provisions of the law regarding the supply of water.

A thoroughly formulated methodology of environmental audits served as a basis for the Draft Law on Environmental Audit.

Moreover, fundamentally new technologies were designed and made, and a pilot mobile facility for thorough purification of industrial and municipal waste was developed and put into practice. There is no doubt that in the future it will be widely applied locally and used in addressing emergency situations.

A number of television programmes and video films were made and adapted to the educational curriculum of the Ministry of Education and Science of Ukraine. A great number of videocassettes were issued containing programmes on the rehabilitation of the Dnipro basin, which were given to the Ukrainian Ecological and Naturalistic Centre for their activities and dissemination. Audio-visual equipment and videocassettes were distributed to the Kaniv boarding school as well as schools in Kyiv, Zaporizhzhia, Kryvyi Rih, and Kherson.

The Dnipro Basin Water Management Administration was equipped with a continuously operating analytical-information processing facility. It monitors and controls the use and conservation of water and the recycling of Dnipro water resources. It also supervises the hydrological regime of the protected water volume of Dnipro water reservoirs.

To assist in the decision-making process of the Ministries and Departments, an interdepartmental digital information-analytical system on Dnipro basin surface water chemical composition and quality was developed and is functioning. Research on the system of biotesting of drinking water quality was carried out. The results of toxicological monitoring of the Dnipro basin were implemented into the system of environmental management.

At the industrial level, environmental audits of two light industry enterprises were carried out in Kyiv and Cherkasy. The results were used to implement efficient cost-effective modernisation measures. A methodology and a programme for ecological modernisation of light industry enterprises were developed.

At the regional level, an integrated environmental audit was conducted at five major enterprises of Zaporizhzhia. Business programmes on ecological modernisation of production were developed. Cost-effective environmentally oriented innovations demonstrating the economic efficiency of the auditing methodology, which was a first for Ukraine, were introduced at five enterprises. A book called *Ecological Audit* was published, funded by the International Dnipro Foundation and approved as a textbook for high schools by the Ministry of Education and Science of Ukraine.

Another important accomplishment took place in Zaporizhzhia—a unique production of organic-mineral fertilisers from sewage sludge and mineral waste from industrial processes. Two major problems were resolved at once—the development of technology and production of a high-quality fertiliser, as well

as the utilisation of municipal sewage sludge and a significant amount of other regional industrial waste in the Dnipro basin.

A pilot plant was built to treat polluted leachate flowing from the Polygon No. 1 waste disposal site in the village of Levanivske to Zaporizhzhia. Measures were taken to treat the wastewater and chemical wastes and partially divert ground waters that flooded the waste disposal site. A cost-benefit analysis was done to assess methods and measures for controlling flooding in the settlements of the Dnipro basin. The levels and types of pollutants entering the Dnipro with the ground water were published. Extensive work was conducted for demonstration purposes at one of Poltava's mining plants.

Taking into account the limited financial resources for nature conservation measures, a pilot investment project based on environmental leasing was implemented upon the recommendations of an ecological audit.

Extensive and significant work was done in support of ecological entrepreneurship, audit, and environmentally friendly production. The International Ecological Entrepreneurship Support League was established and began its work in Ukraine.

The impact of chopped up small branches of trees on the fertility of Ukrainian soils was thoroughly studied. Based on the results of the study, a unique environmentally friendly technology was developed to improve soil fertility and reduce water pollution in the agriculture and forestry industries.

Ukraine's first CD-ROM version of a national atlas was created, consisting of 176 maps, about 200 charts and diagrams, over 100 photos, and 150 pages of text. The National Atlas of Ukraine contains general information about the country, its natural environment and resources, population, economy, and current state of the environment, including that in the Dnipro basin.

Thus, a great amount of work was done within the framework of the Ukrainian-Canadian Co-operation Programme. In many cases, its results demonstrated an ability to address the problems of the ecological rehabilitation of the Dnipro collectively. We can attest without qualification to the effectiveness of international co-operation. To a great extent, the results obtained from the co-operation depended on the environmental consciousness of Ukraine's government officials.

These achievements were made possible due to the efficient administration of the project. This system of administration was based on fundamental

principles such as expediency, transparency, trust, professionalism, and objectivity. This took into account the interests of the cooperating environmental bodies, and not only the interests of water consumers, and it relied on the local problem-solving potential. In addition, it was based on solid pragmatic principles and is oriented towards the future. This is the ideology and the administrative philosophy that is capable of preserving common humanitarian values, or natural values in a time of globalisation, especially in the area of environmental conservation.

The history of international co-operation provides precious lessons and new opportunities. Keeping the problem of the ancient mighty Dnipro in mind, one wishes to become wiser, conscious of one's past and considerate about the future for those generations to come.

The greatest lesson of the programme was the fact that its participants acquired a new way of thinking ecologically, an ecological wisdom and understanding of the need to co-operate for the sake of a great ecological aim, the understanding of the unity and integrity of ecology as well as its spirituality.

What conclusions may be drawn from the seven years of research and experience in finding ways and approaches to resolve the complex problems of the Dnipro basin in the new Ukraine? Seven years of Ukrainian-Canadian co-operation on the ecological rehabilitation of the Dnipro basin and the improvements in drinking water quality produced remarkable results for Ukraine in terms of the implementation of new principles and methodologies. Demonstration and pilot projects were completed on the implementation of efficient basin management methods, namely:

- systemic research on the ecology of the Dnipro basin applying modern methodologies and state-of-the-art equipment;
- assessment of the ecological and economic impacts of the implementation of the newest technologies for water purification, landfill sites, and ecological modernisation of production facilities;
- development of a strategy for combating anthropogenic negative natural processes in the Dnipro basin on the basis of pilot data acquisition;

- development of fundamentally new approaches to environmental management using state-of-the-art information technologies;
- development of a methodology for the delivery of environmental audits of various types of enterprises in different regions of the Dnipro basin and the implementation of cost-effective conservation measures according to the results of the assessments;
- development of a methodology and principles for economic-financial mechanisms for executing basin-wide environmental programmes and projects;
- initiation of an education process in Ukraine to address the above-mentioned issues through seminars, series of videos and TV programmes, and preparation and implementation of corresponding textbooks and courses into the curriculum;
- primary measures in support of environmental entrepreneurship in the Dnipro basin.

Through the years, Ukrainian-Canadian co-operation has built a partnership of trust and pragmatism. Business and informal relations developed among people, enterprises, and institutions of various types of ownership on both sides.

Another significant result of the international co-operation is that it entirely meets the strategic goals and objectives of the National Program for the Environmental Rehabilitation of the Dnipro Basin and Improvements in Drinking Water Quality, approved by the Verkhovna Rada (Supreme Council) of Ukraine on February 27, 1997. As a result of the co-operation, organisational, socio-economic, scientific, and financial mechanisms were developed for the implementation of the National Program.

To provide a more emphatic and affirmative reply to the question posed in the title of this chapter, we can refer to the long-term experience of international co-operation on the ecological rehabilitation of the world's great river basins such as the Nile, Danube, Mekong and Amazon. [17]

The Nile

The Nile River flows across the territory of Egypt, Sudan, Ethiopia, Kenya, Uganda, Zaire, Rwanda, Burundi, and Tanzania. It is 6,825 km long. The formation of the contemporary Nile began about 10,000 years ago. International co-operation in the Nile basin has a centuries-old history and is directed at the distribution of water for irrigation among the basin countries. The practice of irrigated crop farming arose in Egypt and Sudan about 5,000 years ago. The key environmental problems of the Nile basin are droughts, desertification, deforestation, erosion, channel silting, and floods, causing hunger and infectious diseases.

The Danube

The Danube River flows across the territory of Germany, Austria, Croatia, the Czech Republic, Slovakia, Romania, Bulgaria, Moldova, and Ukraine. It is 2,857 km long. Currently, the International Strategic Action Plan (SAP) for the Danube River Basin (1995-2005), developed through a UNDP/GEF (Global Environment Facility) programme and approved by the participant countries, is being implemented. The European Commission, the United Nations, and the World Bank were the chief players in its development. Its implementation is co-ordinated by the Target Group of the participant countries.

The major problems connected with the Danube are a high load of biogenic matter and eutrophication; contamination by hazardous waste, including petroleum, micro-organisms; and substances that cause heterotrophic growth and oxygen depletion; and relations between water consumers.

The problems associated with water use were mainly the result of poorly organised shared water basin management and low water use tariffs. New tariffs have balanced water demand and usage.

The SAP is an important result of the first stage of the Danube environmental programme. It ensures co-ordination of activities structured to achieve the goals of basin water use management. It is also directed at the transition from centralised management to a decentralised one—involving all the Danube riparian countries—and at a balanced regulation strategy.

The SAP defines a strategy to resolve the environmental problems of the Danube. It establishes short-, mid-, and long-term targets and determines their order of implementation. The short-term target was met in 1997, while the mid-term target is expected to be achieved before 2005. Task lists to facilitate the achievement of goals are designed for each sector involved in managing the river at the regional and local level municipal water companies, communal service enterprises, industrial enterprises, the population, NGOs, agricultural enterprises, and farms.

These tasks will be implemented according to the national action plans developed by the Danube basin countries. The national plans will prioritise the funding of projects.

First, the Action Plan addresses public officers of national, regional, and local governments, who all share responsibility for the implementation of the Danube Protection Agreement and the national environmental programmes according to the Environmental Action Program in Central and Eastern Europe. Industry, agriculture, NGOs, and the community also play an important role in programme implementation. Regional strategies stipulated in the Action Plan are designed to support national decision-making on water resource management, as well as the rehabilitation and protection of risk-prone areas of the Danube basin.

Despite the various problems, interests and priorities in the Danube basin, the countries share a common concern and have agreed upon common principles that define the SAP's objectives and tasks. They provide for preventive principles, the use of state of the art technologies and advanced experience for pollution control, contamination control at the source, employing the principles of responsibility and polluter-pays, and, in addition, information exchange between the countries implementing the SAP.

The Mekong

The Mekong River flows through the territories of China, Laos, Cambodia, Vietnam, and Thailand. It is about 4,600 km long. It is the only river in the world whose environmental rehabilitation programme management has been entrusted to a non-basin country, namely, Japan.

The programme encompasses the development of all aspects of cultural and environmental heritage, as well as tourism. The territorial development strategy of the Great Mekong basin includes:

- development of basic infrastructure to activate the economy within the sub-regions for 20 years, i.e., till 2020 (creation of an East-West road network);
- exploitation of water and hydroelectric resources without harmful effects on the environment;
- development of key sectors and branches of the economy;
- stimulating agriculture (reconstruction of main roads, improvements in market opportunities and conditions for their development);
- development of tourism infrastructure (protection of historical monuments and the natural environment);
- operating staff training;
- legislative improvements;
- consideration for fundamental human necessities;
- provision of priority assistance to Laos and Cambodia.

In 1995, the International Mekong Commission was created and in 1996 the International Great Mekong Area Development Strategy was passed. The research within the framework of this strategy was conducted by the Japan International Co-operation Agency for the Mekong basin countries. In addition to the Mekong River Commission, the region is assisted by the Great Mekong Sub-region Economic Association, which is directed by the Asian Development Bank and Indo-Chinese Forum and supported by Japan.

The Amazon

The Amazon River flows across the South American countries of Brazil (66% of the total basin area), Peru (15%), Bolivia (12%), Columbia (5%), Ecuador (2%), and Venezuela (1%). It is 6,000 km long. This is the only great river in the world in which the rich primeval state of its resources still largely exists. The

task of international co-operation was to conserve and protect the unspoiled basin ecosystem from destruction and strengthen its ability to remain intact.

There are no specific integrated measures for the Amazon River basin aimed at improving the ecosystem resource management policy. The National Policy of the five basin countries is based on compliance with international norms, provisioned at the 1992 International Conference on Water and Environment in Dublin and the 1992 Rio Earth Summit. In Brazil, these norms were integrated into the new national Water Resource Law (an example of water management harmonisation).

When one compares the four characteristic examples of international co-operation on the great rivers of the world, it is clear that only the approach to the Mekong River programme provides for ecological and cultural integrity and the harmonisation of ecological and spiritual components of the development of the river basin. It is very worthwhile studying the experience of all these rivers and applying it to the future Programme for the Harmonisation of the Dnipro River Basin. The spiritual focus of the Mekong Programme makes it the most applicable to the problems of the Dnipro in terms of its harmonisation philosophy.

The international community assessed the scale of the national and international environmental tragedy of the Dnipro River in 1992 within the framework of Agenda 21 as outlined at the Rio Conference. Methodological as well as monetary assistance was (and still is) provided to Ukraine, Belarus, and Russia to develop a new basin philosophy, management methodology, and decision-making process.

The development of new environmental approaches has been a very difficult process, due to interdepartmental and international incongruence. The first task for the purpose of the environmental rehabilitation of the Dnipro was to establish effective co-operation among the interested governmental and non-governmental institutions with the assistance of Canadian experts. Secondly, it was necessary to transform the 'know-it-all' psychology of many managers in order to implement new methodological instruments of environmental audit and management. This path of new knowledge was traversed, unfortunately, without any further adequate state support. Nevertheless, it produced results (as outlined in Section xxx in this book), the description of which served as

a basis for the Ukrainian collective monograph *Environmental Rehabilitation of the Dnipro.* [30]

The book describes the modern lessons of the 'wisdom of the Dnipro,' acquired by the participants in this international environmental co-operation. These are lessons of tolerance and loyalty towards others' views and approaches, lessons of systemic approaches towards comprehensive problem-solving, lessons of serious co-operation with nature and appreciation of nature's dominant role in our lives.

The National Program for the Environmental Rehabilitation of the Dnipro Basin and Improvements in Drinking Water Quality formed the essence of international co-operation. The programme was approved by the Verkhovna Rada on February 27, 1997, based on society's awareness of the following:

- environmental rehabilitation of the Dnipro basin and improvement in drinking water quality is an urgent, socially important task;
- the tendency towards environmental deterioration of the Dnipro basin water bodies may endanger the population of Ukraine and result in biological and genetic degradation, possibly having a detrimental effect on economic development;
- under conditions of a strained water management balance and the unfavourable environmental state of the Dnipro basin which came about due to structural distortions and inadequate water protection measures, it is impossible to practice ecologically sound utilisation of water resources without making adequate changes to current environmental policy and practice;
- the restructuring of economic complexes must guarantee the people's ecological safety and the rehabilitation of the environment;
- the poor environmental state of water bodies, combined with inferior water treatment practises and technology, are the main reason for deteriorating drinking water quality, giving rise to various diseases, undermining people's health, and reducing the quality of the nation's genetic potential—water resources should not endanger people's health;

- there is an urgent need to implement proactive (as opposed to reactive) preventive measures of water resource protection and rehabilitation.

One of the most important ecological lessons for participants of the Co-operation Programme was the marked enhancement of their level of awareness regarding the natural wholeness of the basin's ecosystem. They had an opportunity to realise the complexity involved in the environmental rehabilitation of a great river, which includes the water network of major and minor rivers of the basin, ground water, forests and land resources, the geological and scenic environment, wildlife, fisheries, and the economies of major and minor cities.

It should be emphasised that the revitalisation of the basin and the ecosystem of our great river is an important national objective, requiring the surmounting of the obstacles of interdepartmental, interregional, and international disagreements. Only the strict regulation of basin management principles and national priorities will enable us to harmonise the people's interests with those of the natural environment, as well as to develop and implement model infrastructures for harmonious basin water management, water treatment, and sustainable environmental rehabilitation of live aquatic resources on the entire Dnipro basin territory.

The results of many years of international co-operation on the rehabilitation of the Dnipro basin have created an optimistic outlook. They are outlined in a monograph entitled *The Ecological Rehabilitation of the Dnipro* (Shevchuk and Zh. Helmet, scientific supervisors) published in Ukraine. This work may be regarded as a summary of the lessons learned and experience gained from co-operative efforts to solve the problems of the Dnipro.

Additional optimism comes from those lessons of wisdom which have assisted numerous participants in international co-operation to go beyond the boundaries of ordinary thinking and to master the philosophy of ecological co-operation and partnership. All this was accomplished in new Ukrainian textbooks and manuals, such as *Economics and Ecology of the Dnipro*, *Environmental Audit*, *Ecological Enterprise*, *Modernisation of Production: Systemic and Ecological Approach* and others. They have all gained great popularity among specialists and post-secondary students. This, in itself, may be regarded as a proliferation of ecological consciousness, the permeation of new ideas into so-

ciety. We hope that these works will facilitate a new way of ecological thinking. We wish to awaken our spirituality and evoke a desire to embark on practical work, in the name of the future of our children and grandchildren, and in the name of the cradle of their existence, which is the ecosystem of the beautiful and mighty Slavutych basin.

Thus, once again, we will repeat the exact name of the phenomenon that gave rise to the concept of sustainable development—the global socio-ecological crisis, closely associated with the spiritual crisis of man.

V. I. Danilov-Danilyan, K. S. Losev.
Prominent Russian environmentalists

VI. FROM THE ENVIRONMENTAL REHABILITATION OF THE DNIPRO TO THE SPIRITUAL REBIRTH OF NATIONS

THE PATH FROM ecology to spirituality is a path of enlightenment, a path towards understanding the divine destiny of humankind to protect and to take care of the earthly paradise, towards the realisation that a neglect of this destiny will turn the earthly paradise into an earthly hell.

The new philosophy of life is a philosophy of a systemic look at the planet's existence, of an integrated harmonious approach towards survival. Moreover, our modern philosophy of life corresponds very closely to the ancient, oriental philosophy of dynamic equilibrium. According to the Taoist Chinese philosophy of life, all natural phenomena are the manifestations of the perpetual fluctuation between two poles, where all transformations occur gradually in an integrated progression.

Natural order (wisdom) is one of the parameters of the dynamic equilibrium between Yin (everything that is compressible, sympathetic, conservative) and Yang (everything that is expanding, aggressive, inquisitive).

The essence of nature's lessons of wisdom is that humanity should come to understand the following, seemingly simple truth: deliberate and aggres-

sive infringement upon the dynamic equilibrium of nature (the Yang factor) is detrimental to our health (spiritual and physical) due to a process occurring in the inner dynamic equilibrium which destroys the divine harmony between humankind and nature, as well as between the soul and the body.

Since ancient times, the purpose of science has been to understand the natural order and to understand the harmonious existence of humans within that natural order. In the 7th century A.D., the purpose of science became the acquisition of extensive knowledge that could be used to dominate nature. Up to the present day, science and technology are used for dangerous, destructive, and deeply anti-environmental purposes. An inertia in anti-environmental activities is still common, despite the environmental priorities of sustainable development proclaimed at the UN Rio Conference in 1992. The root of the problem lies in the loss of spirituality, in the oblivion of the profound archetypal world outlook that forms the essence of ecological consciousness and ecological wisdom, which are so indispensable to the relationship between humankind and nature.

World famous politicians, scientists, and public figures who have dedicated their lives to environmental problems, have come to a spiritual insight and to the essence of the genuine cause of environmental crises.

A famous English scientist in the field of the theoretic physics of elementary particles, Fritjof Capra, [35] understood nature's wisdom as "...divine, eternal unanimity of Nature and Reason, fundamental unanimity of all Nature's phenomena." After fifteen years of communication with other outstanding contemporaries, he came to the understanding of the ecological paradigm as a fundamental notion of progress in the world, science, and society, a revelation of a new ecological view of reality and the social consequences of this eco-cultural transformation. This is the kind of world outlook (salvational), characterised by genuine spirituality, which forms the essence of wise ecological consciousness.

Indira Gandhi's words are quite relevant: "I have always been very sensitive to nature, very conscious of it. I was lucky to grow up with a strong feeling of affinity towards the animate world. Plants, animals, stones and trees have been my companions." She also mentioned that India has an ancient tradition of environmental protection. The great Indian ruler Ashoka, who reigned for almost forty years in the 3rd century B.C., considered it his duty to protect not

only the citizens but also the forests and wildlife. "Throughout all of India," stresses Gandhi, "we see orders engraved on stones and cliffs that are twenty-two centuries old, which address current environmental issues." [35] These are the ecological lessons of wisdom. They depict the mysteries of the relationship between people and nature of the whole history of human existence on our planet, which today is plagued by cataclysms. The falls of ancient civilisations, in many cases, were brought about not only by major natural disasters but also by the people. Historians have provided evidence that the irrational use of the Tigris and Euphrates Rivers for land irrigation purposes destroyed the once powerful Babylon. Unforgivable carelessness, if not thoughtlessness, of the present time—excessive drainage from the rivers feeding the Aral Sea—has brought about the demise of the Aral Sea. Similarly, in the near future, the Sea of Azov could cease to exist. Not long ago, this sea was one of the richest biological resources of inland water in the world. Indeed, when God wishes to punish us, he takes away our power of reason!

Former US Vice-President Albert Gore, an American politician and ecologist, dedicated a entire chapter in his book *The Earth in the Balance. Ecology and the Human Spirit* to the issue of the ecology of the soul. He realizes that

> ...spiritual sensation of our place in nature is more ancient than the aboriginal cultures of America; its source extends further and further back to the very beginning of human civilisation. The deeper I search for the roots of the global environmental crisis, the more I am convinced that it is an outer manifestation of an inner crisis, which is, for lack of a better word, spiritual.

Capra admits in his confessional book *Lessons of Wisdom* [35] that he

> ...identified a deep connection between ecology and spirituality. I came to the understanding that profound ecological consciousness is spiritual in essence, and I realised that ecology, founded on such spiritual consciousness, may become the western equivalent of the oriental traditions.

The leading participants in the International Dnipro Programme—the authors of this book—also came to the understanding of the link between ecology and spirituality and the need for the adequacy of ecological and religious spirituality.

Unfortunately, the spiritual aspects of international co-operation were not systemically incorporated into Agenda 21. [63] Apparently, the 21st century was expected to unfold under a logo of non-spirituality. Yet, spirituality and culture should be considered equal components along with the economic, social, and ecological elements of the World Action Plan.

The divine wisdom manifests itself in a pre-established harmony, that is, harmony of the body and soul, consciousness and reason, humankind and nature. In recent years, a notion has arisen that the crisis of religious systems is the result of environmental crises. Based on this notion, a problem exists because human civilisation builds its relationship with nature upon fundamentally unethical principles. Since religion has always been the most influential guide for civilisations, the search for the root of the problem has pointed towards religious systems (Judaism, Christianity).

Not every religion directs us to 'possess' the earth as a gift from the time of genesis. Hinduism and Buddhism do not grant such a right. The Christian religion calls for parsimonious management. Let us recall the biblical passage mentioned earlier: "The LORD God then took the man and settled him in the Garden of Eden, to cultivate and care for it." (Genesis, 2:15) True believers ought to remember that even during the times when they 'possess' the earth, they must take care of it and protect it.

The spiritual sensation of our place in nature goes back thousands of years. Our ancestors worshipped only one Goddess—the Earth, the original mother of all living matter, who maintained a harmonious co-existence among all living things. Nowadays, Mother Earth is worshipped by peasants, who adore her and thank her for bread, a gift from God. A common feature of many religions is the recognition of the holiness of water. Christians are baptised in water as a manifestation of purification. According to the Koran, "everything is made of water". In the Lotus Sutra, Buddha is present metaphorically in the form of a "rain cloud" that covers, fertilises, and enriches "all thirsty living creatures." Nowadays, we see what a great pilgrimage is attracted to the Ganges River and to the belief in purification. Sikhism, a South Indian branch of Hinduism, established around 1500, attaches great significance to the comprehension of nature. Its founder, guru Nanak, said: "Air is the vital force, Water—the Forefather, the vast Earth—the Mother of all; Day and Night are the teachers, who caress all creatures in their arms". According to the Holy Sikh Book, *The*

Guru Granth Sahib, humans are formed from five parts of nature that teach us and give us power, during the time when the personality is developing: "the Earth teaches us Patience and Love; the Air teaches us Mobility and Liberty; the Fire teaches us Warmth and Courage; the Sky teaches us Liveliness, Broadmindedness; the Water teaches us Cleanliness and Purity."

The Christian religion has always included prophecies that caution us and protect us. Many prophecies anticipated environmental destruction, forewarning the transgressors of God's will. For example, those who understand the Bible literally may easily remember Hosea's prophecy "For they sow the wind, and they reap the storm wind." That is exactly what has happened. The materialists sowed heartlessness—and we reap environmental crises.

The technocratic path of development of the Dnipro basin river system demonstrates the same merciless human imprudence that brought the once matchless cradle of the Slavs to the brink of environmental disaster, languishment, and degradation.

Twenty-two centuries ago (200 B.C.) the Dnipro basin witnessed the formation of Pre-Slavic civilisation and statehood. Unfortunately, at the time there was no ruler as wise as the Indian Ashoka. Later, Yaroslav the Wise came to power, although history is silent as to whether he was ecologically wise. Yet, it is well known that nature deprived his negligent descendants of ecological wisdom: they became self-satisfied strategists and tacticians of openly destructive environmental experiments.

The essence of the forgotten historical wisdom of the Dnipro as a natural entity lay in the deification of nature by ancient ethnicities, in strict compliance with ethnoscenic balance, the ecological wisdom of the Scythians, tillers, fishers, cattle-breeders, who imparted their knowledge of nature through generations. The mentality of contemporary Ukrainian, Belarusian and Russian people with regard to the Dnipro basin is, indeed, permeated with the ecological wisdom of the ancient pre-Slavic nations. However, today, the violation of this ecological mentality, which often borders on violence, has led to the current ethnoscenic imbalance and disharmony, as well as the languishing of the vital forces of the Dnipro aura.

The ethnoscenic aura of our great nationally distinct river has been forming for millennia, protecting and refilling the vital forces of the nations of the Dnipro basin. The genetic power of Zaporizhzhian Cossacks had spread

to Southern Russia, the near-Urals, and Siberia. The stable genotype of the 'Cossack' ethnos survived the violent suppression of the Zaporizhzhian (Kuban, Ural) 'Cossack spirit', the Cossack vital force that is rooted in Indo-European and Scythian ethnic history.

Materialistic philosophy, communist ideology, and unreasonable, heartless scientific and technical progress 'subjugated' the Dnipro in the late 20th century. The communist party and leaders, contrary to common sense, created water reservoirs-sumps and built the cyclopean Chernobyl nuclear power plant in the picturesque ethno-historical site where the pre-Slavo-Baltic (Wends), pre-Slavo-Germanic, and Slavic ethna had once risen.

Unfortunately, the prophecies of ancient seers were forgotten and the Dnipro responded with the Chernobyl accident, the flooding of vast areas and land degradation. There is no lowland river that has suffered as much from human violence as has the Dnipro.

The time has come to reverse the course, to go from environmental crisis to spirituality, from awareness of an ecological abyss to awareness of the effects of a lack of spirituality. More and more people in the Americas, Europe, Russia, and Ukraine realise the inevitability of this path and they are ready to embark upon it. However, we must move along this path, not by small steps, but by giant leaps, in order to avoid dragging out this righteous undertaking over dozens of years.

In Ukraine, the path of environmental enlightenment began with Chernobyl and the National Program for the Environmental Rehabilitation of the Dnipro Basin and Improvements in Drinking Water Quality. Although much has been achieved, not all of the goals have been met and progress toward meeting many of them is getting slower and slower. The problem lies in the fact that, although the Programme is called national, it has yet to become truly national. It is formally still a state programme, where politicians and officials are not concerned with national sanctuaries, where spirituality is not their concern, and where political and corporative goals are materially more important.

The National Program for the Environmental Rehabilitation of the Dnipro Basin, as time has shown, still remains only a good intention. In order for it to work it should be made a matter of national common purpose. It should inspire and awaken the ecological consciousness of the people of the Dnipro basin, the Ukrainian diaspora abroad, and involve all national forces: state, social, business, religious, scientific, educational, and other.

The new life philosophy of the people of Ukraine, Belarus, and Russia should be to approach the Dnipro as a dominant vital force of the nations and not merely as a resource (water, fish, and energy). For Ukraine, the Dnipro should become a national idea that would heal the Ukrainian nation as well as rehabilitate its eco-historical traditions for the sake of future generations.

The Thought about Culture is the Gate to the Future.

Nikolai K. Rerikh

VII. DEVELOPMENTAL CONTRADICTIONS AND ALTERNATIVE MODELS FOR THE HARMONISATION OF LIFE

As we already know from previous chapters, in 1992 the Rio Conference considered and approved a one-and-only sustainable development model, based on the global humanity survival strategy. It incorporated principles of environmental, social, and economic strategies, environmental interests of societies and states and mindful acceptance of the limitations of environmental and economic development.

The last ten years has shown that the "global program for change," as described by Ms. Brundtland in her report to the Commission, has failed to be adequately reflected in the sustainable development programmes. More importantly, none of these programmes has reached the implementation stage. Both developed and developing countries continue to practice the same old ways and approaches as in the past. Governments see their future mostly in terms of poorly monitored ad-hoc activities (macro-extrapolation) and are in a position to offer only 'tinkering around the edges' measures, designed mainly for pollution abatement and resource conservation. [15] Moreover, developing countries, in their "race for sustainable economic development," must follow in the footsteps of the developed countries, taking the path of ruining nature,

the path of misbalance and disharmony. Thus, a substitution of concepts occurs—the goal of universal sustainable development is superseded by the goal of a customised 'sustainable economic development' for regions and countries.

The intent was to do better but the result was as bad as before. The global methods for reaching these admirable goals are historically far from the best means, confirming once again their 'counterproductiveness'. The result is well known: the system indicators of the environment are moving in a downward spiral, new environmental problems are appearing, and new disease prevalence patterns are spreading. What is really going on in the world? As a matter of fact, instead of changing the route of civilisation's development, which the World Conference was calling for, practically all countries have superseded sustainable development models by conventional development strategies. They are proceeding with old methodologies, built upon traditional technical and financial capabilities to address social crises and problems of immense environmental importance. In Ukraine and Russia, at the level of government policy development, 'innovation and technological breakthrough' trends are prevalent. The environmental consequences of these 'breakthroughs' are either not taken into account at all or are merely given cursory attention, just to observe the formality of complying with international obligations. [32, 39, 42, 64]

Thus, the five key contradictions that had to be dealt with within the framework of the Action Plan for the 21st century are still there after ten years. The present and future generations of people on the earth will confront the following contradictions:

- between actual life and a life in harmony with nature: the right of all human beings to a healthy and productive life in harmony with nature should be the focus of attention;
- between actual development and the environment: the environmental constituent should become an integral part of the development process;
- between interests of contemporary and future generations: human needs and environment conservation targets should be included in the set of values for every generation;
- between rich and poor countries and people: the gap between living standards should be reduced, famine and poverty elimi-

> nated, the 'appetite for resources', greed, and breach of agreed-upon conduct checked.

In the authors' opinion, one of the main reasons for the resiliency of the above-mentioned contradictions is rooted in the inability or lack of good will in merging spirituality, nature, and human life in the attempt to resolve the complex and vitally important problem of humanity's survival. Defiance of the lessons of history, diversity of forms of civilisation development on earth, including the models of harmonious co-existence with nature, defiance of the experience of regional ethnoscenic balance with a variety of life values system, and especially, those, in which spiritual and ecological values dominate over the material ones, so-called 'consumerism' (India, Tibet with a population of more than a billion people).

In this regard, it is important to quote what Albert Gore, one of the political ideologists of global sustainable development, said in his book *Earth in the Balance: Ecology and the Human Spirit:*

> The resurgence of fundamentalism in every world religion, from Islam to Judaism to Hinduism to Christianity; the proliferation of new spiritual movements, ideologies, and cults of all types and forms; the popularity of New Age doctrines and the current fascination with exploratory myths and legends from cultures across the world—all this gives as evidence that there is indeed a spiritual crisis in modern civilisation that seems to be based on its inner emptiness and the lack of an overriding spiritual purpose. [19]

The words of this famous American ideologist deserve special attention, since they contain the recognition of the main reason for the failures of the global sustainable development strategy—ignoring the spiritual constituent as a genuine driving force for change and the development of civilisation.

Entertaining alternative approaches to social harmony, the well-known historian Toynbee wrote in his work *The Study of History* [72] that among the three economic/development models (North American, Western European (English-Scandinavian), and Communist), preference should be given to the English-Scandinavian model, as it calls for a balance between private enterprise (capitalism) and state regulation in the name of social justice (communism).

On top of it, Scandinavian countries display their adherence to environmental principles. The Scandinavian development model can be credited as being by far the most harmonious and as such should be studied and disseminated. Further, Toynbee writes about spirituality: "Incidentally, we impoverished souls by kicking the great artists out.... They were the spirit keepers for our ancestors... and now we complacently revel in the spiritual vacuum that we have created." At the same time, he claims that people in African and Eastern cultures live in harmony with their traditions and spirituality.

In *Lessons of Wisdom*, Capra makes the following claim: "It is irrelevant whether we refer to that crisis as 'energy, ecological, urban or populist driven'. We should admit that they are rooted in the inadequate, narrow perception of reality." He sees the model of the future (sustainable) society in Heiderson's model, i.e., in "...cultural transformation of the petrochemical age and industrial era into the new Solar Age." The culture of the solar age is all-inclusive: it contains environmental concerns, embraces a multitude of civil society groups, and is centred on social and environmental problems. The new type of economic management appears (decentralised and co-operative), which is a merger between an ecologically sensitive lifestyle and spirituality. Technologies should be based upon environmental principles and dovetail with the new system of values.

In *Culture and Technology: War of Civilisations,* [44] the Russian philosopher V. A. Kutyrev considers the model of sustainable society as the ultimate aim of harmonious development, based on cultural traditions, through which humans' natural needs and social basics are manifested.

As we can see, the subject matter here is all about a new system of values, about the connection between ecology and spirituality. The suggested global model of sustainable development of society was based on the old system of values, which has brought it into disrepute. In this respect, the views of Moiseyev, spelled out in his work *Man and the Noosphere*,[52] deserve our attention. Referring to V. I. Vernadsky, he says that "the societal development, coordinated with nature, responsibility for nature and its future integrity will bring about a special organisational grid and create special social structures with capacity to provide co-ordinated development" (e.g., local spiritual-ecological eco-social megapolises with the right to self-government and non-traditional sustenance systems).

Modern society is comparable, in many ways, to an abstract society. Humanity is divided into two camps: one wants to survive and stay 'within the bounds of humaneness' and the other, the more aggressive one, wants greater reliance on self-programmed technical systems driven by artificial intellect. According to Kutyrev, the contradictions between the two, which have been latent so far, will acquire a dominating presence in the 21st century. Broadly speaking, we are talking about the struggle between spirituality and lack of spirituality, ecological compatibility and incompatibility. Proponents of non-spirituality and ecological incompatibility don't need culture, traditions, or history. The victory of global tendencies over historical heritage will spell out the end of human history. Kutyrev states:

> Culture is the air, the atmosphere in its ultimate manifestation—it is the ozone layer of the civilisation, without which it won't exist as humanity for a long time. Nature, the animated human corporality is the soil that humanity grows on. Take it away, and there would be no atmosphere and no culture.

Further, he draws a conclusion: a concept of sustainable development will rest on firm footing once it aims to achieve a logical and obvious goal: sustainable society should be based on both the outer and inner environment surrounding the human being, i.e., harmony between people and nature. The result would be a human race that is sensitive, rational, spiritual, holistic, and aware of its role in nature.

In the sustainable or, better yet, harmonious society, the emphasis should be placed on stabilizing innovations; on dynamic equilibrium rather than just progress; the attainment of high level culture and spirituality rather than a civilisation of abstract dimensions.

Gumilyov [21] interprets the theory of dynamic equilibrium as an ethno-landscape balance which determines social development. He examines models of sustainable local landscapes and ethnic groups and surprisingly proves that directly through them, human and societal links with the natural environment are realised, inasmuch as ethos is, in essence, a natural phenomenon. This scholar believes that ethnographic and economic diversity provides sustainability for societies and countries and determines their status. He maintains that all ethnos formations should strive towards a gradual transfer to this

ethnoscenic balance with its diversity of forms within the boundaries of a society or a state.

As we can see, there are significant differences between the concept of sustainable development as offered to humanity in Rio de Janeiro for implementation through national action plans and other development models with different philosophical-methodological approaches and priorities, life values, and strategic aims.

According to the *Law on System Development at the Expense of the Environment,* [65] all development which does not fully engage natural resources is reduced to absurdity.

This law is also applicable to social systems. However, when the subject is a 'sustainable development', a warning is introduced: "within the bounds of bearing capacity supporting the ecosystem". At the same time, G. Daily, Y. Tinberg, T. Haavelmo, and other notable economists proved that the world is already "filled to the brim" with economic systems and nature can no longer be considered simply as a source of limitless resources, but rather should be approached as the foundation for life. [23] Modern ways of development lead to instability and the deepening of the crisis. In order for the future to happen at all, a retreat or slowing down of the pace of development and a certain healing process must take place. No development is possible when the life forces of humanity and nature are exhausted. It is worth talking about the 'harmonisation of life values', or 'life forces'—and only after we appreciate these can we discuss the achievement of a 'sustainable society.' It is all about the concept of retreat, slowing down the rate of growth, healing for the sake of the harmonisation of life forces (natural, material, spiritual, cultural, and social) and the achievement of a sustainable society. The 'development' concept should give way to 'harmonisation' with an emphasis on spiritual values. This means the orderliness of life as opposed to chaos and the full and total co-ordination of the laws and principles of human life with the laws of nature and ecology. With this approach, the noosphere idea, noospherogenesis as the rational existence of people and nature, becomes the focal point in this process of harmonisation.

It can be argued that it is not that bad that Ukraine, as well as Russia and Belarus, are lagging behind the American/European rush to 'sustainable development.' This lag allows for some time to think through the development

philosophy, learn from the mistakes of others, and make our own national choices for a harmonious future. Fortunately, even today Ukrainians hold spiritual values in high esteem. The 'rat race' towards American/European standards corrupts spirituality. We need national standards for the quality of life built on our own national values and priorities.

From our point of view, the harmonisation of the life activities of society must be based on the following general principles:

- philosophical values of human and social life based on the cultural and spiritual traditions and socio-ecological integrity of the natural environment;
- ecological healing of natural entities and landscapes, reduction of technogenic load, and the harmonisation of society and state;
- defining wisdom and culture as a measure of and noosphero-genesis as a methodological basis for the harmonisation process;
- harmonisation of life is the simultaneous improvement of the physical and the spiritual nature of humanity and is considered by society as an absolutely necessary measure for the rehabilitation and restoration of the life forces of nature, using biotic regulation methods as a way to achieve and maintain the dynamic equilibrium of all life forces (spiritual, natural, and material);
- humanising all education as a way of life, as a driving force of the harmonisation process and the enrichment of the life forces of humanity, society, and state;
- defining innovation and change as methods for lending support to sustainability and the dynamic equilibrium of life forces;
- adjusting technologies to local conditions and achieving independent energy sources and self-sufficiency based on the principles of social justice;
- defining the life forces for humankind, family, ethnos, society, nations, and states as a higher set of values.

In Ukraine, a school of life harmonisation is beginning to take shape. It is based on the teachings of the first president of the National Academy of

Sciences of Ukraine, Vernadsky, who introduced the ideas on animated matter, noosphere, and the biological integrity of life. A publication has been prepared covering various approaches to the problems of noospherogenesis and harmonious development.[80]

Life harmonisation models can be analysed following the studies performed on small scale eco-centers or socio-cities (Ye. K. Marchuk).[47] Based on numerous modern scientific, philosophic-theoretical works, periodicals on the strategy for the development of civilisation, and the specifics of modern social and economic development, including fundamental works by D. Bell, V. Inozemtsev, M. Kastels, A. Maslow, Sh. Tatsuno, and D. Tapscott, Ye. K. Marchuk all offer and confirm the idea of a socio-city as a new type of social-ecological-economic societal order directing us towards original territorial corporations with a variety of life harmonisation mechanisms. The author is confident that the implementation of the eco-socio-urban model "will be able to quickly solve the problem of using the potential of modern social trends and direct the internal transformation of our society in such a way that will make the international integration of Ukraine... a natural process."

The suggested principles of life harmonisation and eco-socio-urban models can be implemented in the Dnipro basin using the expertise of international co-operation and the experience of the environmental rehabilitation of the world's major rivers—the Danube, Amazon, Nile, and especially the Mekong, with its ecological-cultural integrity.

The International Dnipro Programme (Ukraine, the Russian Federation, and the Republic of Belarus) has already started functioning within the framework of the UNDP/GEF project Preparation of a Strategic Action Plan (SAP) for the Dnipro River Basin and Development of SAP Implementation Mechanisms.

From the authors' point of view, the strategic action plan should be developed taking into account the above-stated principles of life harmonisation with their practical demonstration using the example of minor eco-socio-cities. There are a number of steps for achieving this.

First, the programme of international co-operation should be brought to the highest state level—the level of the Presidents of Ukraine, Russia, and Belarus.

Second, communities should be activated by establishing an International Dnipro Basin Cities Association under the patronage of the presidents of the partnering states.

Third, a mixed governmental-public executive entity should be established—a Basin Steering Committee—with a mandate to initiate and monitor strategic decisions.

And finally, a Dnipro International Convention, built upon the millennia-old experience of understanding the spiritual principles of the harmonious development and stabilisation of life of nations and countries should be designed and approved to become a part of everyday life of people residing in the basin area.

Borysphen will be the first to disclose the path
With gifts and tongues more attractive.

Nostradamus (Centuries)

VIII. OUR OWN PATH TOWARDS HARMONY

The Dnipro basin is not merely an environment inhabited by 33 million people of Ukraine, the Russian Federation, and the Republic of Belarus. It is a unique storehouse of a multitude of historical-archaeological monuments and sites of European and world significance. It includes the mysterious Pre-Cimmerian petroglyphs of the Stone Tomb at the Molochna River, Europe's ancient Trypillia cities, Dereyiv breed horses, Scythian farming and cattle breeding, the first coins of Olvia, and more.

Historical-archaeological centres have been established in the Dnipro basin, representative of Ellin-Scythian culture (Byelske Horodysche) in the Poltava Oblast, Trypillia culture in Cherkasy Oblast, the Ellin culture of Olvia in the Mykolayiv Oblast. But, of course, that does not suffice. The number of such centres should grow and historical-cultural tourist routes should be created. The spiritual treasures of our ancient land ought to be managed under national jurisdiction. Centres for spiritual purification should be established and serve as sites for the rebirth of national self-identity, to replenish the spiritual forces (the centres of Seredniostohiv, Chernyahiv, Mezin, Deriyiv, Chornolissia, Losogub, Kyiv, and other basin cultures).

The Kyiv hills and the Dnipro banks once nurtured one of the most ancient

European civilisations—Kyivan Rus. The historical roots of the Dnipro reach the depths of millennia. One of the pathways of the Great Silk Road extended along the Dnipro from Volga Bulgaria through Kyiv towards Western Europe and the Mediterranean Sea. This road could be recreated as a future project for an international tourist route (for example, a trip by Dereyiv horse).

The thousand-year-old eco-cultural greatness of the Dnipro, its spiritual and ecological aura have been feeding the vital forces of the people inhabiting the basin, of the people of Ukraine, Russia, and Belarus. According to a hypothesis by Danylenko, the ancient name of the Dnipro—the Borysphen—is associated with "a storehouse of vital forces." In the late 20th century, these forces were undermined. In addition to all the misfortunes already befallen the ancient Dnipro, saddled with hydroelectric dams, the most treacherous one happened—a violent attack against the spirituality of the people who had lived in harmony with nature. The absence of any spirituality among the conquerors of nature brought Chernobyl to the Dnipro banks, 'blooming' reservoirs, sludge-pools, flooded areas (artificial deluge on the Dnipro) and other environmental and spiritual calamities, as well as the suffering to people.

The peoples of the Dnipro, whose ancestors were tillers and cattle-breeders on one of the world's richest black soils,* worshiped Mother Earth and never thrust a spade into the ground without necessity. They never cut bread, they merely broke it using their hands. The *toloka* was the foundation of their lifestyle. They animated water and purified themselves with it on the Epiphany. As present-day Muslims gather in Mecca for their spiritual purification, not too long ago Orthodox believers had a tradition of making a pilgrimage from near and distant parts of the Slavic world for spiritual purification to the revered Kyiv and the Kyiv Pechersk Lavra.

The Dnipro basin is a common home for all peoples who share ancient Slavic traditions, culture, and spirituality. Awareness of the historical, cultural, and ecological communality is a necessary condition for saving this common heritage. Nowadays, the ecological and spiritual aura of the Dnipro suffers from a serious ailment. It does not matter were the ailment is, be it at the headwaters, the middle of the river, or the mouth: the ailment affects everybody and

* The European Land Resources Laboratory in Paris contains a Black-Soil sample collected from the Dobrovelychkivsky Rayon, Kirovograd Oblast, Ukraine.

everything. The ecological rehabilitation of the Dnipro is, first of all, a moral and spiritual task. Unless everyone, every individual, accepts this notion, no amount of international aid will produce a single tangible result in addressing the problem. The problem must be resolved as soon as possible. It ought to engage every individual from the Dnipro basin, from teachers and priests to representatives of scientific and business circles.

We have a divine destiny to "cultivate and care for" our environment, which we have thus far failed to achieve. Yet, we can see our modern role. Let the true believers be reconciled by the unity of this great spiritual and ecological purpose. They will become the leaders of a spiritual-ecological movement for the sake of the salvation of the once paradisiacal waters and lands of the Dnipro basin, with its picturesque scenery of small rivers and tributaries, dear to each Ukrainian's heart. The time has come to collect the 'spiritual' stones.

Sowing that which is eternal and wise is a task for the pedagogues and scholars. The ecology and vital forces of the Dnipro are eternal. Education and enlightenment should become everyone's way of life and pedagogues—the followers of our wise predecessors V. Sukhomlynsky, Rerikh, Vernadsky, Podolynsky, and other world famous enlighteners—should become our guides of knowledge and culture. According to Vernadsky, noosphere, noospherogenesis is the philosophy of wisdom. A reasonable coexistence with nature is, indeed, a moral principle of upbringing, a comprehensive school of noospherogenesis, and the basis upon which the wonderful uniqueness of nature is built, a unique richness of archaeological monuments of the Dnipro. Knowledge feeds the mind, and knowledge about nature, its riddles, mysteries, and laws of existence, purifies our essence and our mind from the informational heartlessness and inveterate political cynicism, regenerating and strengthening our origins and our genetic essence.

Science must regain its original purpose of deepening and enriching human wisdom and the true understanding of the harmonious integrity of nature. Before it is too late, we must reconsider our attitude towards development as merely a process of economic growth. We should resist the pressure to increase gross domestic product and devote ourselves to the criteria of social and ecological health and the quality of human existence. Market supply and demand should not dictate the rate nor the quality of life. The pace of life should be determined by ecological demands and the harmonisation principles

of human existence. The individual, society, and humanity as a whole should develop primarily along spiritual and ecological dimensions. We should rely on the cultural traditions of the people, communities, and ethna, referring at the same time to the principles of wisdom of the holy scripture and nature. All the rest—material, intellectual and natural human needs—should be harmonised using reason.

Technological breakthroughs should be ecologically justifiable and aim first and foremost at the sustenance of dynamic equilibrium on the basis of the utilisation of solar and other renewable energy sources.

The harmony of vital forces is the higher virtue and the higher aim of human existence within the natural environment. It is very difficult to attain this harmony, especially when preference is recklessly given to foreign political and ideological guidelines. They try to teach us everything that has been practised since time immemorial by our ancestors, the Slavs and the Zaporizhzhian Cossacks. The democracy of the Zaporizhzhian Cossacks, consolidated in Pylyp Orlyk's Constitution, is much more ancient and democratic than others. Thus, let us refer to our predecessors, to the wisdom of the Indo-European people, to whom we are bound by our historical past. They had lived in harmony with nature for millennia (India, Tibet, Scandinavia); for them spiritual forces and values have always been the essence of existence, and not 'consumerism' reduced to vulgarity and absurdity.

Today, there are already wonderful examples of wise actions, conscientious and good-hearted initiatives. For example, the non-governmental organisation Ridna Zemlya ("Homeland") from Kyiv and the pan-Ukrainian social movement Simeyne Dzherelo ("Family Source") have developed and are implementing a project which foresees the establishment of a network of ecological settlements. The settlements are based on a new culture, new education, a new form of community life, new production principles, and, finally, a new attitude towards the environment based on family land parcels and family estates. The partners in the project include the public organisation Stvorennia ("Creation")—Donetsk, Zemlekorystuvach ("Land User")—Zhytomyr, Rodova Zemlya ("Ancestral Land"), the club Anastasia—Kyrovohrad, and other non-profit organisations.

We, the people of the Dnipro basin, should accept our own eco-spiritual code of life, our own ecological basin constitution—a codification of fundamental laws for the harmonisation of life and the achievements of the highest moral principles of our coexistence with nature.

The ecological rehabilitation of the Dnipro basin is a spiritual, moral, physical, and genetic rehabilitation of the nations inhabiting it. It involves conscious compliance with the laws of nature and harmony which should become the norm of life for people and societies of the Dnipro basin. The following are the most important of them:

- **Fundamental Laws on Ecology** (Barry Commoner): everything is interconnected; everything has its place; nature knows best; nothing is granted for free (these are the premises of the harmonisation process).
- **The Rule on the Extent of Transformation of Natural Systems**: one cannot exceed the limits of self-sustaining capabilities (self-organisation and self-regulation). This is also a premise of the harmonisation process.
- **The Principle of Naturalness**: as time passes, the eco-socio-economic efficiency of 'technical devices' steadily diminishes, while the economic expenditures for their sustenance steadily increase.
- **The Rule on Socio-Ecological Balance**: society develops only to the extent that it may maintain a balance between its own pressure on the environment and its capability of regenerating this environment, regardless of whether it is a natural or artificial process.
- **The Principle of Cultural Management of Development**: development criteria in which economic profit and enrichment prevail is anti-ecological. A new paradigm for human cultural behaviour is required in the management of development. This law is a reflection of the profound interaction process between society and nature on one hand, and society and people (social groups) on the other hand. The process of harmonisation corresponds to this law.

- **The Principle of Ecological Conformity**: the form of existence of an organism (human) always corresponds to the living conditions (harmonisation aims to change the living conditions in order to reach a state of ecological conformity).
- **The Law on Common Influence of Factors**: the interrelation of ecological factors and their mutual strengthening and weakening stipulate their impact on an organism, and, consequently, on the quality of its life course (polluted air + contaminated water + polluted land + viruses + noise pollution +... = maximum harmful impact).
- **The Stability Principle**: any relatively closed ecosystem with an energy flow passing through it during the process of self-regulation develops in the direction of a sustainable state (the harmonisation process oriented towards the achievement of sustainable society).
- **The Rule on Relative Inner Non-Discrepancy**: the functioning of species within natural ecosystems is oriented toward sustenance of these ecosystems as their habitats (it does not occur in artificial ecosystems).
- **The Principle of Ecological Complementarity**: no functional part of an ecosystem can remain viable without the other complementing parts (the harmonious completeness of life forces).
- **The Law on Internal Dynamic Development**: matter, energy, information, and the dynamics of natural systems and their hierarchy are interdependent. Any change within the environment inevitably leads to natural chain reactions aimed at neutralising the change or the formation of new natural systems. These new systems may be irreversible and may produce negative results if the changes to the environment are significant. This law is the backbone of environmental management and is the main law on life harmonisation.

- **The Law on System Development at the Expense of the Environment**: any system may develop solely based on the exploitation of its environment. This law operates both in natural and social systems. The term 'sustainable development' contradicts this law and the principles of harmonisation.
- **The Law on Functional Systemic Irregularity**: the rates of reactions and the passage of phases of system development (in reaction to external factors) are naturally irregular—they accelerate (strengthen) and decelerate (weaken), which is known as harmonious pulsation.
- **The Principle of Aberration of Living Conditions**: the more deviations there are within an environment, the fewer the species within it.
- **The Principle of Systemic Complementarity**: either the systemic complementarity principle will be observed with respect to the relationship between Homo sapiens and nature, or the ecological crisis will exacerbate to a state of catastrophe (systemic harmonisation of relationships).
- **The Law on Decreasing Efficiency**: increasing a specific energy input into an agro-system will not result in an adequately proportional increase in its productivity (fertility).
- **The Rule on Acceleration of Historical Development**: the faster the rate of environmental change due to human impact, the faster the rate of change in the socio-ecological characteristics of people and societal development. The process may be equally positive or negative, and, consequently, it is more difficult to reach harmonisation under these conditions.
- **Vernadsky's Law on Noosphere**: the biosphere will inevitably turn into a noosphere, that is, a system in which the human mind will play the dominant role in the harmonisation of the human-nature relationship.

Only a common effort, a one-of-a-kind 21st century ecological toloka' involving the 33 million people of the Dnipro basin will be able to save it and strengthen its vital forces and, consequently, the vital forces of every person, family, settlement, and society as a whole. Today, there is still a chance to preserve the Dnipro's vital forces for our children and grandchildren if the people of this Great River choose their own path of harmonisation. There is still hope if they give preference to their own life values, their own historical traditions, which are genetically coded in each of us by the previous cultures and civilisations that once lived and left their historical and spiritual aura in the Dnipro basin.

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INDEX

PLACES

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NAMES

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REFERENCES

RIVERS

Agassiz lake
Amazon
Aral Sea
Azov Sea
Baltic Sea
Bazavluk
Berezyna
Black Sea
Caspian Sea
Danube
Desna
Dnipro
Dnister
Don
Dvina
Euphrates
Hudson Bay
Ingulets
Kama
Kuban
Marmora Sea
Mediterranean Sea
Mekong
Volga
Western Dvina
Molochna
Neman
Nile
Oka
Prypiat
Rhine
Ros
Samara
Siversky Donets
Sozh
Supiy
Teteriv
The Dnipro-Buh canal
The Dnipro-Donbas canal
The Dnipro-Ingulets canal
The Dnipro-Kryvyi Rih canal
The Dnipro-Neman canal
The Kakhovka canal
The Kakhovka Reservoir
The Kaniv Reservoir
The Kremenchuk Reservoir
The Kyiv Reservoir
The Northern-Crimean canal
Tigris
Tyasmyn

OLD NAMES OF THE RIVERS

Borysthen / Borysphen or Borusthen = Dnipro
Hipakirys = Kalanchak
Hipanis = Southern Buh
Istr = Danube
Pantykapa = Konka
Ra, Ras = Volga
Tanais = Don
Tyra = Dnister
Varos, Danopros, Slavuta = Dnipro

ARIAN (IRANIAN) NAMES OF THE RIVERS

Apazha
Apaka
Artapolot
Asman
Vorskla
Domotkan
Esman
Rat
Khox
Reut
Samotkan
Svapa
Syev
Seim
Sula
Sura
Udai

OBLASTS/REGIONS

Cherkasy
Chernihiv
Kharkiv
Kherson
Kyiv
Mykytyn Rih
Pereyaslav
Poltava
Rivne
Smolensk
Zaporizhzhia
Zhytomyr

NAMES OF INSTITUTIONS AND ORGANIZATIONS

AGRA Inc. (a Canadian based engineering, construction and technology services company)
Association of the Dnipro Basin Cities
Basin Steering Committee
Industrial complex "Zaporozhstal"
International Dnipro Basin Cities Association
The Asian Development Bank
The Department of Cultural Affairs of UNESCO
The Dnipro Basin Water Management Administration
The Ecocentre of Zaporizhzhia
The European Commission
The Great Mekong Sub-Region Economic Association
The International Dnipro Foundation (former Dnipro Renaissance Foundation)
The International Ecological Entrepreneurship Support League
The Japan International Co-operation Agency for the Mekong Basin Countries
The Mekong River Commission

PROGRAMMES

EVENTS

The International Conference on Water and Environment, Dublin (1992)
The Rio Earth Summit = World summit on sustainable development (1992)
United Nations Conference on Environment and Development (UNCED)

HISTORICAL NAMES

Babylon
Berezan Island
Churingas
Dyke Pole (wild field)
Great Scythia
Great Silk Road
Hetman
Indika
Ionia
Kamiana Mohyla
Kosh
Kyivan Rus
Olvia
The Kyiv Pechersk Lavra
Velyky Luh (large meadow)
Zaporizhzhian Cossacks

CIVILIZATIONS

Aryans
Cimmerian
Hellenic
Hindu
Indo-European
Scythian
Slavonic
Trypillian
Wend

CULTURES

Alazonians
Bilohrudy
Budins
Chernyahiv
Chornolissya
Cimmerians
Ellin
Ellin-Scythian
Kyiv
Lendel
Sarmatians
Scythian Hellenes
Scythians
Seredniostohiv
Slavonic
Stohiv

PERIODS/EPOCHS

SCYTHIAN TZARS